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## ENVIRONMENTAL GEOLOGY NOTES

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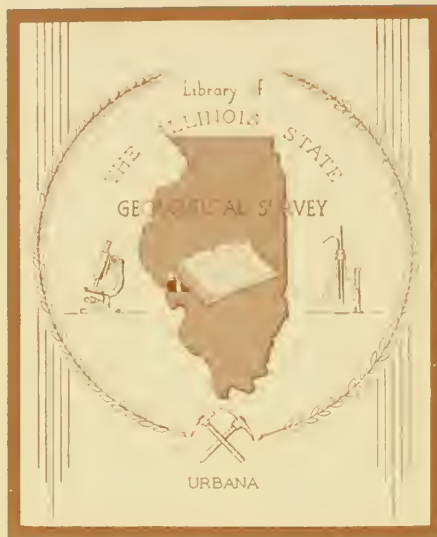
NOV 19 1965

# DATA FROM CONTROLLED DRILLING PROGRAM IN MC HENRY COUNTY, ILLINOIS

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DATA FROM CONTROLLED DRILLING PROGRAM  
IN MC HENRY COUNTY, ILLINOIS

Charles R. Lund

Descriptions of character and sequence of materials and data on relative consistency, natural water content, and grain-size distribution are given for glacial deposits tested and sampled, as a part of a controlled drilling program, at eleven sites in McHenry County, Illinois.

INTRODUCTION

Data gathered from field and laboratory analyses of samples collected from eleven holes drilled in McHenry County (fig. 1) are presented here. These holes were drilled as part of a study of water resources management in the six-county metropolitan area of northeastern Illinois. Fifty-two holes were drilled in the area to obtain data and samples of the subsurface unconsolidated materials, which are mainly glacial drift deposits. The program was coordinated by the Northeastern Illinois Metropolitan Area Planning Commission and financed by a planning grant provided by the Federal Home and Housing Finance Agency. The work was supervised by the Illinois State Geological Survey, and drilling was performed under contract by the Layne-Western Company of Aurora, Illinois.

The first number of this series (Environmental Geology Notes 1, April 1965) gave the specific objectives of the drilling and sampling program, a description of the drilling methods and equipment used to obtain the samples, and an explanation of the methods used to perform the various tests made on the samples by both the contractor and the Illinois Geological Survey. Environmental Geology Notes 2, May 1965, presented data collected for nine borings drilled in DuPage County, and Environmental Geology Notes 6, October 1965, presented data collected for eleven holes drilled in Kane, Kendall, and DeKalb Counties.

IDENTIFICATION SYSTEM

The numbering system used to identify the borings is based on the location of the boring. The number of each hole consists of the county abbreviation, township, range, section, and coordinates within the section.

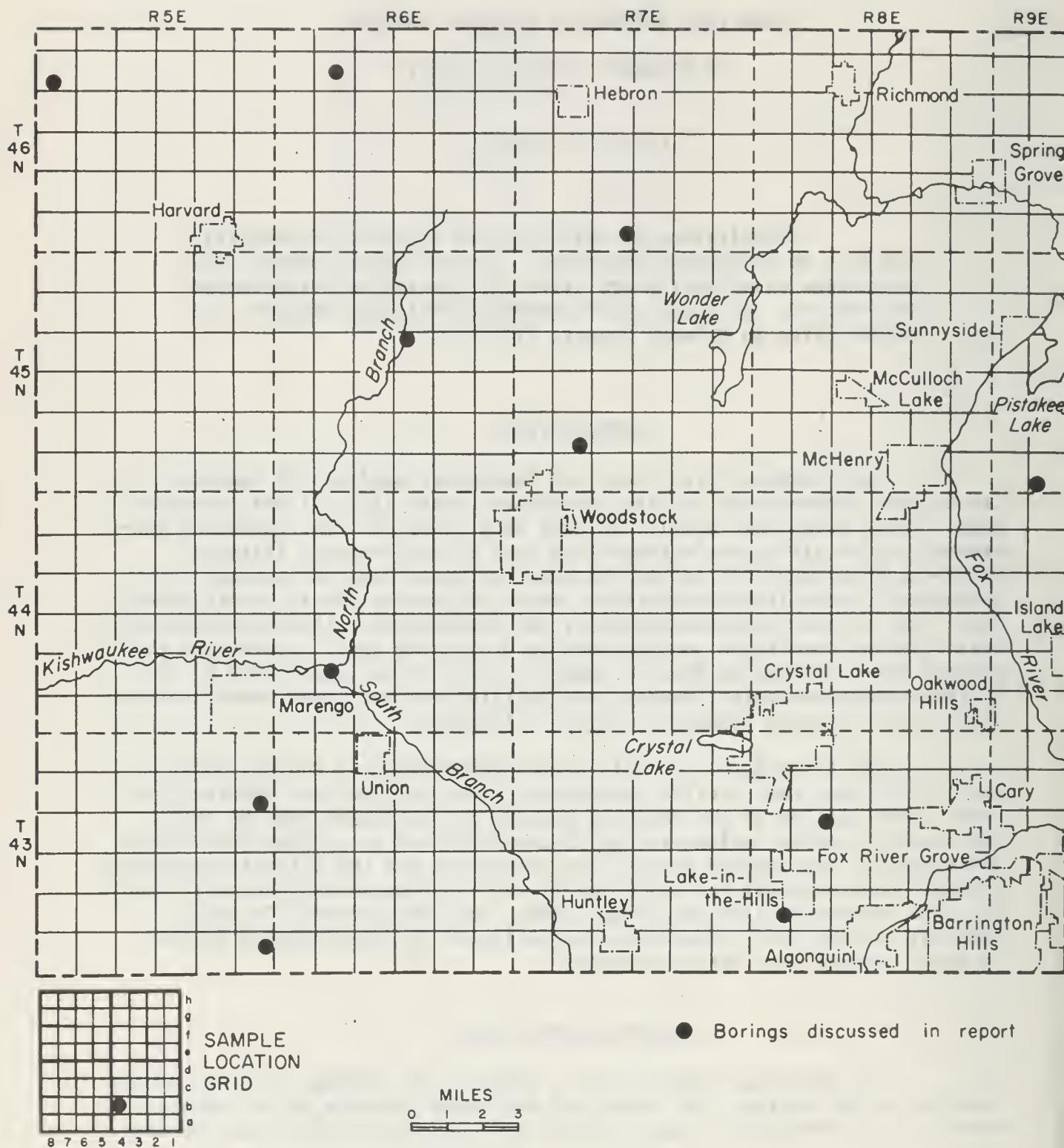


Fig. 1 - Location of borings in McHenry County



Sections are divided into rows of one-eighth-mile squares. Each square contains 10 acres and corresponds to a quarter of a quarter section. A normal section of one square mile contains eight rows of eighth-mile squares; an odd-sized section contains more or fewer rows. Rows are numbered from east to west and lettered from south to north as shown in the grid on figure 1. For example, a well located in square 4b of section 12, township 43 north, range 5 east, would be numbered MCH 43N5E-12.4b. Where there is more than one boring in a 10-acre square they are identified by arabic numbers after the lower case letter in the boring number, for example MCH 43N5E-12.4b2.

A location map is presented for each of the eleven borings, drawn on the scale of one inch equals 2000 feet, or 1:24,000, the scale of the United States Geological Survey 7½-minute quadrangle topographic maps. The borings have been located within the 10-acre coordinate squares, with as much accuracy as this scale permits, according to detailed footage locations from easily recognizable landmarks supplied by the contractor.

The quadrangle topographic map on which the boring is located is identified on the location map. Quadrangle maps may be obtained from the Illinois State Geological Survey, Urbana, or from the United States Geological Survey, Washington, D.C.

#### EXPLANATION OF NOTES ON DRILLING RECORDS

The abbreviations and symbols used by the contractor on the drilling records included in this report are listed below.

Blows/18" - number of blows required to drive the split-barrel sampler 18 inches of penetration (see Environmental Geology Notes 1, p. 2, for detailed description). Weight of hammer and length of drop for the various depth intervals are indicated on the log heading.

81/2" - number of blows (81) required to drive a split-barrel sampler a certain number of inches (2").

Recovery (in.) - length of the sample retained in the sampler.

Q<sub>u</sub> - unconfined compressive strength expressed in tons per square foot (TSF).

MC - natural moisture content.

SS - split-barrel sampler 1 3/8 inches inside diameter (ID).

2S - split-barrel sampler 2 inches ID.

3S - split-barrel sampler 3 inches ID.

W - wash sample

The relations between descriptive terms for relative density and relative consistency and the quantitative expressions for these aspects of the materials follow.

| Relative Density  |          |
|-------------------|----------|
| Description       | Blows/ft |
| Very loose.....   | 0 - 5    |
| Loose.....        | 5 - 10   |
| Medium dense..... | 10 - 30  |
| Dense.....        | 30 - 50  |
| Very dense.....   | 50+      |

| Relative Consistency |                       |
|----------------------|-----------------------|
| Description          | Q <sub>u</sub> in TSF |
| Very soft.....       | 0.0 - 0.25            |
| Soft.....            | 0.25 - 0.5            |
| Medium.....          | 0.5 - 1.0             |
| Stiff.....           | 1.0 - 2.0             |
| Very stiff.....      | 2.0 - 4.0             |
| Hard.....            | 4.0+                  |

Descriptions of materials given in the drilling records were made in the field by the sampler and are not necessarily consistent with the laboratory data. Stratigraphic interpretation of the borings is under study and is beyond the scope of this report.

#### SIZE-DISTRIBUTION ANALYSIS

Analysis of the density and grain-size distribution of the cohesive and noncohesive materials was carried out in the laboratories of the Illinois State Geological Survey, Urbana. The Tyler sieves and their U.S. Standard equivalents used in the grain-size analyses, the diameter of the mesh openings in inches and millimeters, and the Wentworth grain-size classification are shown on page 5.

The data presented in the size-distribution analysis for each boring are classified as follows:

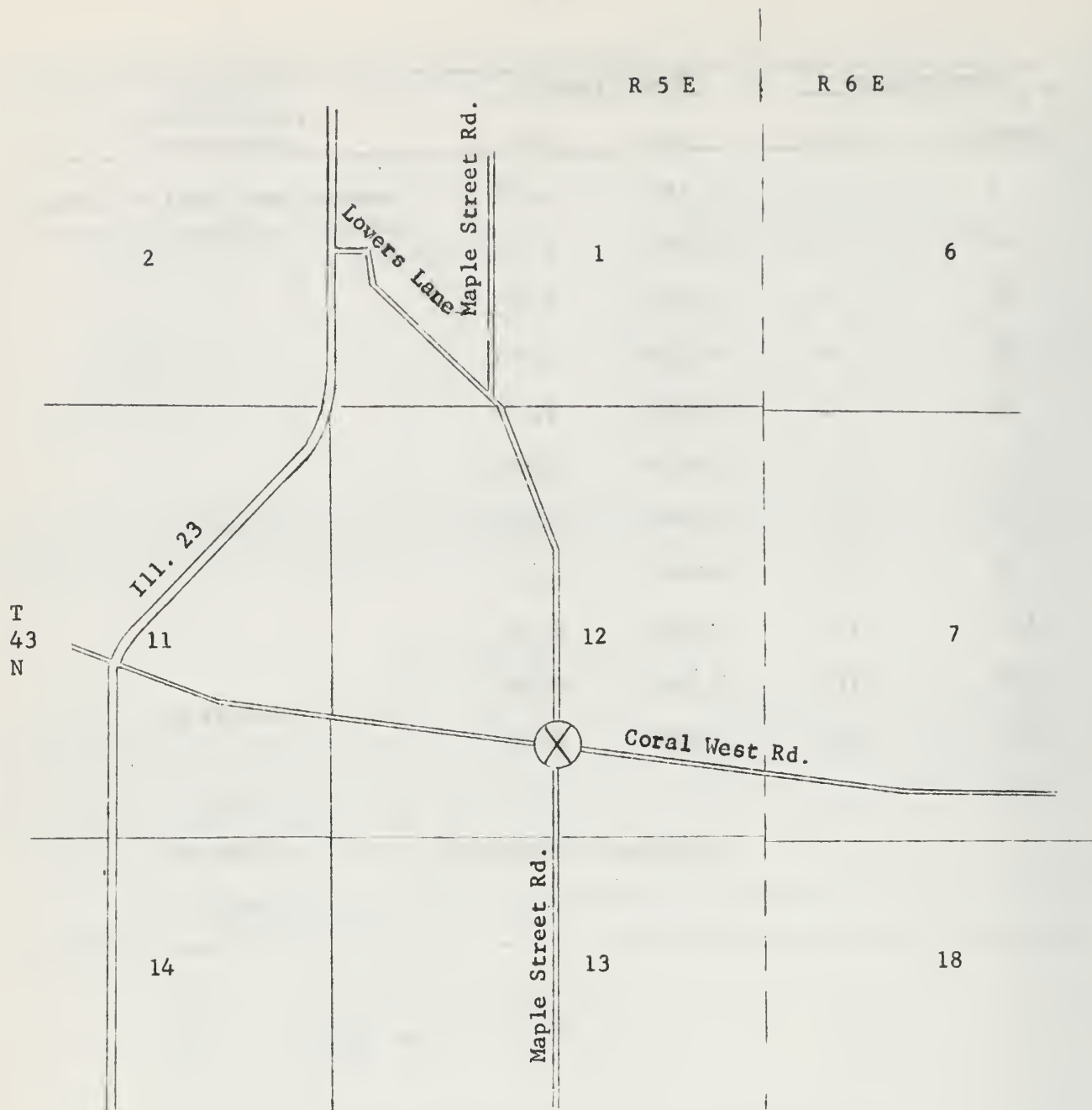
gravel - > 2.0 mm  
sand - < 2.0 mm and > 0.062 mm  
silt - < 0.062 mm and > 0.004 mm  
clay - < 0.004 mm

Some of the sample numbers in the tables giving grain-size data on the cohesive and noncohesive materials have letter symbols added that indicate the following:

A - top bag of sample where two bags were used for a sampled interval.

B - bottom bag of sample where two bags were used for a sampled interval.

| Sieve number     |       | Mesh diameter |       | Grain-size<br>classification<br>(Wentworth) |
|------------------|-------|---------------|-------|---|
| U.S.<br>Standard | Tyler | in.           | mm    |   |
| 4                | 4     | 0.185         | 4.699 | Granules and pebbles (gravel)               |
| 10               | 9     | 0.078         | 1.981 | -----2.0 mm-----                            |
| 18               | 16    | 0.0390        | 0.991 |   |
| 25               | 24    | 0.0276        | 0.701 |   |
| 35               | 32    | 0.0195        | 0.495 |   |
| 45               | 42    | 0.0138        | 0.351 |   |
| 60               | 60    | 0.0097        | 0.246 | Sand  |
| 80               | 80    | 0.0069        | 0.175 |   |
| 120              | 115   | 0.0049        | 0.124 |   |
| 170              | 170   | 0.0035        | 0.088 |   |
| 230              | 250   | 0.0024        | 0.061 | -----0.0625 mm-----                         |
|                  |       |               |       | Silt  |
|                  |       |               |       | Hydrometer separation -----0.0039 mm-----   |
|                  |       |               |       | Clay  |



Location Detail

104' N of Coral West Road  
19' E of Maple Street Road  
1000' W, 900' N of SE<sub>c</sub>, sec. 12  
Genoa Quadrangle

Fig. 2 - Location of boring MCH 43N5E-12.4b

DRILLING RECORD FOR MCH 43N5E-12.4b

|                           |                             |                |
|---------------------------|-----------------------------|----------------|
| Surface elevation: 902 ft | Boring method: Hollow auger | Rotary         |
| Date started: 8-7-62      | (0-105 ft)                  | (105-191.5 ft) |
| Date completed: 8-30-62   | Hammer weight: 140 pounds   | 475 pounds     |
|                           | Hammer drop: 30 inches      | 36 inches      |

| Depth<br>(1"=10') | Description of material   | Samples |           |               |                        |                             |                |      |
|-------------------|---|---------|-----------|---------------|------------------------|-----------------------------|----------------|------|
|                   |   | No.     | Type      | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 16.5              | Till - sand, clayey, brown,<br>slightly reddish, pebbly,<br>slightly grayish at 16' | 1       | 2S        | 2.5- 4.0      | 18                     | 12                          | 0.9            | 12.3 |
|                   |   | 2       | 2S        | 5.0- 6.5      | 18                     | 13                          | 0.7            | 11.2 |
|                   |   | 3       | 2S        | 7.5- 9.0      | 18                     | 18                          | 1.4            | 12.2 |
|                   |   | 4       | 2S        | 10.0-11.5     | 12                     | 11                          |                | 12.2 |
|                   |   | 5       | 2S        | 11.5-14.0     | 18                     | 13                          | 1.0            | 12.3 |
| 22.5              | Till - clayey sand to sandy<br>clay, gray, slightly pink;<br>trace of pebbles       | 6       | 2S        | 15.0-16.5     | 10                     | 16                          |                | 12.0 |
|                   |   | 7       | 2S        | 17.5-18.0     | 12                     | 13                          | 1.4            | 11.3 |
| 31.0              | Sand, gravel, gray, slightly<br>brown, saturated                                    | 8       | 2S        | 20.0-21.5     | 20                     | 11                          |                | 11.3 |
|                   |   | 9       | 2S        | 22.5-24.0     | 10                     | 8                           |                |      |
| 52.0              | Till - clay, sand, silt,<br>grayish brown; pebbles,<br>slightly pink                | 10      | 2S        | 25.0-26.5     | 10                     | 31                          |                |      |
|                   |   | 11      | 2S        | 27.5-29.0     | 6                      | 61                          |                |      |
|                   |   | 12      | 2S        | 30.0-31.5     | 14                     | 51                          |                |      |
|                   |   | 13      | 2S        | 32.5-34.0     | 13                     | 17                          |                | 14.1 |
|                   |   | 14      | 2S        | 35.0-36.5     | 18                     | 22                          | 1.5            | 11.3 |
|                   |   | 15      | 2S        | 37.5-39.0     | 18                     | 26                          | 2.2            | 10.9 |
|                   |   | 16      | 2S        | 40.0-41.5     | 18                     | 22                          | 1.9            | 12.1 |
|                   |   | 17      | 2S        | 42.5-44.0     | 18                     | 18                          | 1.8            | 10.9 |
|                   |   | 18      | 2S        | 45.0-46.5     | 18                     | 18                          | 1.8            | 10.7 |
|                   |   | 19      | 2S        | 47.5-49.0     | 18                     | 22                          | 2.0            | 10.7 |
|                   |   | 20      | 2S        | 50.0-51.5     | 18                     | 23                          | 2.2            | 10.6 |
|                   | 21  | 2S      | 52.5-54.0 | 18            | 35                     | 2.0                         | 10.9           |      |

(Continued)



DRILLING RECORD FOR MCH 43N5E-12.4b - Continued

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                   |                             |                |      |
|-------------------|--|---------|------|---------------|-------------------|-----------------------------|----------------|------|
|                   |  | No.     | Type | Depth<br>(ft) | Recovery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
|                   |  | 22      | 2S   | 55.0- 56.5    | 12                | 34                          | 1.7            | 10.7 |
|                   |  | 23      | 2S   | 57.5- 59.0    | 14                | 39                          |                |      |
|                   |  | 24      | 2S   | 60.0- 61.5    | 18                | 40                          | 2.9            | 10.1 |
|                   |  | 25      | 2S   | 62.5- 64.0    | 14                | 43                          |                | 9.0  |
|                   |  | 26      | 2S   | 65.0- 66.5    | 18                | 38                          | 2.2            | 9.7  |
|                   |  | 27      | 2S   | 67.5- 69.0    | 14                | 38                          | 1.3            | 12.0 |
|                   | (Description on preceding<br>page)   | 28      | 2S   | 70.0- 71.5    | 18                | 100                         | 4.5+           | 7.6  |
|                   |  | 29      | 2S   | 72.5- 74.0    | 18                | 28                          | 1.7            |      |
|                   |  | 30      | 2S   | 75.0- 76.5    | 18                | 24                          | 0.8            | 10.6 |
|                   |  | 31      | 2S   | 77.5- 79.0    | 18                | 22                          | 1.4            | 8.9  |
|                   |  | 32      | 2S   | 80.0- 81.5    | 18                | 18                          | 1.4            | 10.7 |
|                   |  | 33      | 2S   | 82.5- 84.0    | 14                | 25                          | 1.8            | 10.2 |
| 105.0             |  | 34      | 2S   | 85.0- 86.5    | 16                | 18                          | 2.2            | 10.8 |
| 108.0             | Peat, woody, dark brown, grad-<br>ing to black organic silt  | 35      | 2S   | 87.5- 89.0    | 14                | 26                          | 3.1            | 9.9  |
|                   |  | 36      | 2S   | 90.0- 91.5    | 18                | 25                          | 1.2            | 10.2 |
|                   | Sand, gravel, gray-white; a<br>little silt (blue-gray clayey<br>silt near 108'); fine sand at<br>base                | 37      | 2S   | 92.5- 94.0    | 18                | 31                          | 2.0            | 10.7 |
|                   |  | 38      | 2S   | 95.0- 96.5    | 16                | 25                          | 1.5            | 11.0 |
|                   |  | 39      | 2S   | 97.5- 99.0    | 18                |                             | 1.3            | 11.2 |
| 125.5             |  | 40      | 2S   | 100.0-101.5   | 18                | 27                          | 1.2            | 10.6 |
| 128.0             | Silt, gray, interbedded<br>with clayey silt  | 41      | SS   | 105.0-106.5   |                   |                             |                |      |
|                   | Sand, gray, fine, very well<br>sorted with well rounded<br>grains, stratified; beds of<br>fine silt to coarse gravel | 42      | SS   | 110.0-111.5   |                   |                             |                |      |
|                   |  | 43      | SS   | 115.0-116.5   |                   |                             |                |      |
|                   |  | 44      | 3S   | 120.0-121.5   |                   |                             |                |      |

(Continued)

DRILLING RECORD FOR MCH 43N5E-12.4b - Continued

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                |      |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|----------------|------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 148.0             | (Description on preceding page)  | 45      | 3S   | 125.0-126.5   |                        |                             |                |      |
|                   |  | 46      | 3S   | 130.0-131.5   |                        |                             |                |      |
|                   |  | 47      | 3S   | 135.0-136.5   |                        |                             |                |      |
| 171.0             | Till - clay, sandy, gray, with gravel; shale particles; brown mottling in lower part | 48      | 3S   | 140.0-141.5   |                        |                             |                |      |
|                   |  | 49      | 3S   | 145.0-146.5   |                        |                             |                |      |
|                   |  | 50      | 3S   | 150.0-151.5   |                        |                             |                |      |
|                   |  | 51      | 3S   | 155.0-156.5   |                        |                             |                |      |
|                   |  | 52      | 3S   | 160.0-161.5   |                        |                             | 5.2+           | 10.0 |
|                   |  | 53      | 3S   | 165.0-166.5   |                        |                             |                | 11.0 |
|                   |  | 54      | 3S   | 170.0-171.5   |                        |                             |                |      |
| 194.0             | Till - clay, gravelly, gray-brown; a little coarse gravel and sand; a few cobbles    | 55      | 3S   | 175.0-176.5   |                        |                             |                |      |
|                   |  | 56      | 3S   | 180.0-181.5   |                        |                             |                |      |
|                   |  | 57      | 3S   | 185.0-186.5   |                        |                             |                |      |
| 197.0             | *  | 58      | 2S   | 190.0-191.5   |                        |                             |                |      |
|                   | Bottom of hole @ 197.0'  |         |      |               |                        |                             |                |      |

\* Bedrock, dolomite, gray-white at 194'-196'; gray-green dolomitic shale at 196'-197'

SIZE DISTRIBUTION DATA FOR MCH 43N5E-12.4b

| Cohesive Materials |            |            |                                       |             |             |         |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 1                  | 7.0        | 93.0       | 43                                    | 36          | 21          | 2.33    |
| 3                  | 7.0        | 93.0       | 42                                    | 37          | 21          | 2.32    |
| 4                  | 5.0        | 95.0       | 43                                    | 41          | 16          |         |
| 5                  | 6.0        | 94.0       | 42                                    | 35          | 23          |         |
| 6                  | 4.0        | 96.0       | 44                                    | 38          | 18          | 2.34    |
| 7                  | 5.0        | 95.0       | 41                                    | 38          | 21          |         |
| 8                  | 3.0        | 97.0       | 37                                    | 43          | 20          | 2.38    |
| 13                 | 5.0        | 95.0       | 38                                    | 42          | 20          | 2.33    |
| 14                 | 3.0        | 97.0       | 41                                    | 36          | 23          |         |
| 15                 | 12.0       | 88.0       | 40                                    | 43          | 17          |         |
| 16                 | 4.0        | 96.0       | 41                                    | 41          | 18          | 2.27    |
| 17                 | 6.0        | 94.0       | 42                                    | 40          | 18          |         |
| 18                 | 6.0        | 94.0       | 41                                    | 42          | 17          |         |
| 19                 | 5.0        | 95.0       | 41                                    | 44          | 15          |         |
| 20                 | 5.0        | 95.0       | 39                                    | 39          | 22          | 2.40    |
| 21                 | 4.0        | 96.0       | 39                                    | 38          | 23          |         |
| 22                 | 7.0        | 93.0       | 41                                    | 35          | 24          |         |
| 23                 | 7.0        | 93.0       | 40                                    | 45          | 15          |         |
| 24                 | 3.0        | 97.0       | 43                                    | 42          | 15          | 2.46    |
| 25                 | 5.0        | 95.0       | 43                                    | 45          | 12          |         |
| 26                 | 5.0        | 95.0       | 44                                    | 37          | 19          |         |
| 27                 | 8.0        | 92.0       | 44                                    | 43          | 13          |         |
| 28                 | 4.7        | 95.3       | 40                                    | 38          | 22          | 2.33    |
| 29                 | 4.0        | 96.0       | 44                                    | 39          | 17          |         |
| 30                 | 4.0        | 96.0       | 40                                    | 42          | 18          |         |
| 31                 | 6.0        | 94.0       | 40                                    | 42          | 18          |         |
| 32                 | 4.0        | 96.0       | 42                                    | 41          | 17          | 2.37    |
| 33                 | 4.0        | 96.0       | 40                                    | 41          | 19          |         |
| 34                 | 4.0        | 96.0       | 39                                    | 42          | 19          |         |
| 35                 | 4.0        | 96.0       | 39                                    | 41          | 20          |         |
| 36                 | 6.0        | 94.0       | 34                                    | 46          | 20          | 2.40    |
| 37                 | 4.0        | 96.0       | 37                                    | 37          | 26          |         |
| 38                 | 5.0        | 95.0       | 34                                    | 42          | 24          |         |
| 40                 | 7.0        | 93.0       | 32                                    | 42          | 26          | 2.38    |
| 44                 | 48.2       | 51.8       | 71                                    | 18          | 11          |         |

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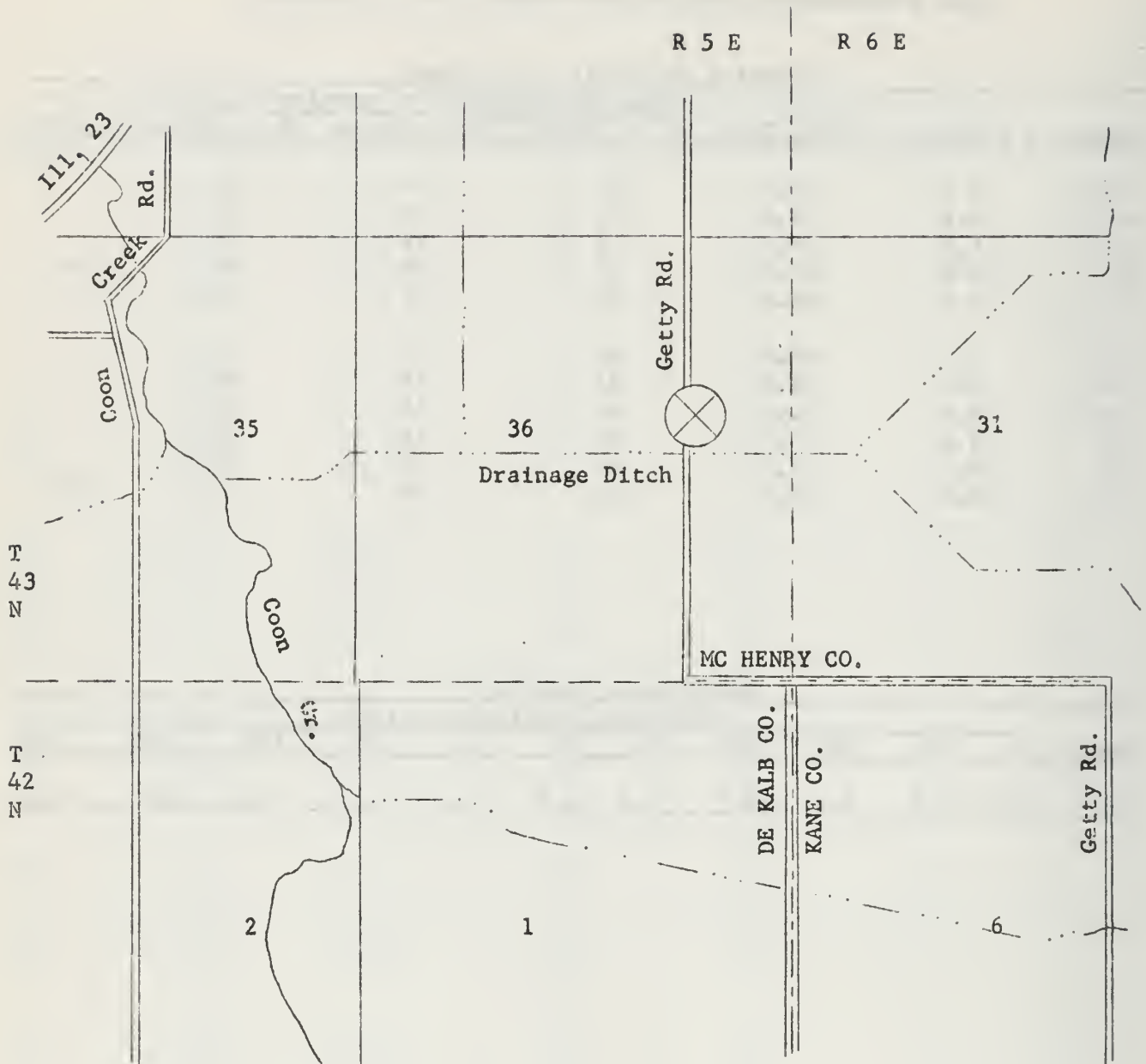
SIZE DISTRIBUTION DATA FOR MCH 43N5E-12.4b - Continued

Cohesive Materials - Continued

| Sample | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|--------|------------|------------|---------------------------------------|-------------|-------------|---------|
|        |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 45     | 1.6        | 98.4       | 33                                    | 46          | 21          |         |
| 48     | 34.4       | 65.6       | 56                                    | 11          | 33          |         |
| 50     | 0.6        | 99.4       | 2                                     | 53          | 45          |         |
| 51     | 43.0       | 57.0       | 27                                    | 39          | 34          | 2.41    |
| 52     | 4.6        | 95.4       | 30                                    | 34          | 36          |         |
| 53     | 8.0        | 92.0       | 30                                    | 33          | 37          |         |
| 54     | 8.9        | 91.1       | 31                                    | 37          | 32          |         |
| 55     | 20.0       | 80.0       | 44                                    | 41          | 15          |         |
| 56     | 12.0       | 88.0       | 32                                    | 51          | 17          |         |
| 57     | 12.5       | 87.5       | 43                                    | 38          | 19          |         |
| 58     | 40.0       | 60.0       | 30                                    | 38          | 32          | 2.23    |

Noncohesive Materials

| Sample | Percentage retained on sieve |      |     |      |     |     |     |     |     |     |     |
|--------|------------------------------|------|-----|------|-----|-----|-----|-----|-----|-----|-----|
|        | 4                            | 9    | 16  | 24   | 32  | 42  | 60  | 80  | 115 | 170 | Pan |
| 10     | 34.5                         | 17.5 | 4.0 | 12.5 | 5.0 | 5.0 | 6.5 | 4.5 | 4.0 | 2.0 | 4.5 |



Location Detail

470' N of Drainage Ditch  
 10' E of cen. line of Getty Road  
 1300' W, 2200' S of NE<sub>c</sub>, sec. 36  
 Genoa Quadrangle

Fig. 3 - Location of boring MCH 43N5E-36.2e



DRILLING RECORD FOR MCH 43N5E-36.2e

Surface elevation: 825 ft  
Date started: 8-27-62  
Date completed: 8-27-62

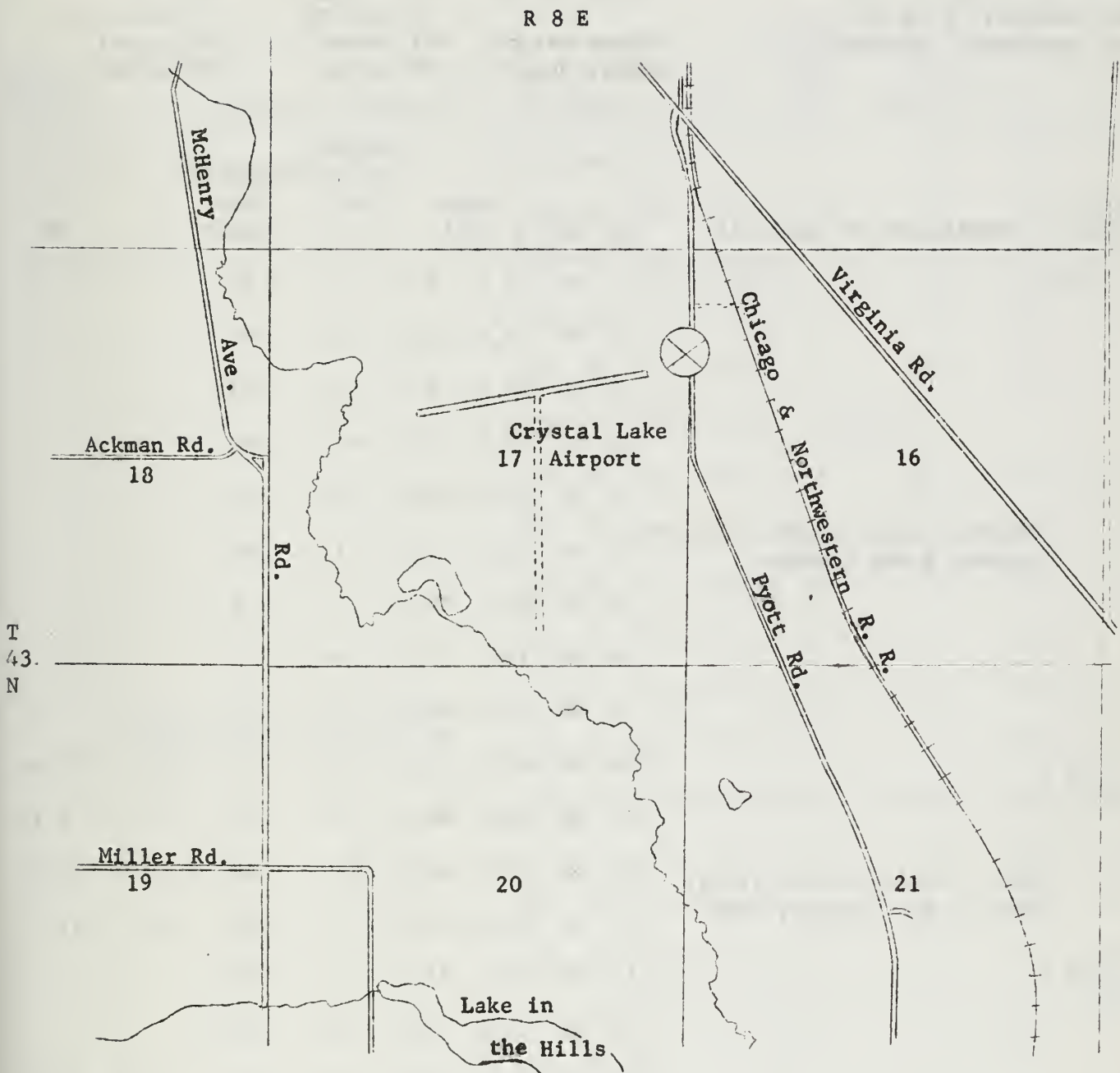
Boring method: Hollow auger (0-75 ft)  
Hammer weight: 140 pounds  
Hammer drop: 30 inches

| Depth<br>(1"=10') | Description of material                                 | Samples |  |               |                        |                             |                |      |
|-------------------|---|---------|--|---------------|------------------------|-----------------------------|----------------|------|
|                   |   | No.     | Type   | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 4.0               | Sand, silty, black; organic,<br>peaty seams             | 1       | 2S   | 4.5- 6.0      | 18                     | 25                          |                |      |
| 38.0              | Sand, gravelly, gray, fine<br>to coarse                 | 2       | 2S   | 9.5-11.0      | 18                     | 78                          |                |      |
|                   |   | 3       | SS   | 14.5-16.0     | 18                     | 16                          |                |      |
|                   |   | 4       | SS   | 19.5-21.0     | 18                     | 25                          |                |      |
|                   |   | 5       | SS   | 24.5-26.0     | 3                      | 10                          |                |      |
|                   |   | 6       | SS   | 29.5-31.0     | 6                      | 16                          |                |      |
|                   |   | 7       | SS   | 34.5-36.0     | 8                      | 30                          |                |      |
|                   |   | 8       | SS   | 39.5-41.0     | 18                     | 15                          | 2.5            | 12.3 |
|                   |   | 9       | SS   | 44.5-46.0     | 6                      | 16                          |                |      |
|                   |   | 10      | SS   | 49.5-51.0     | 18                     | 30                          | 4.6            | 15.0 |
|                   |   | 11      | SS   | 54.5-56.0     | 18                     | 22                          | 3.8            | 16.9 |
|                   |   | 48.0    | Till - pinkish gray sand-<br>silt-clay to silty sand | 12            | SS                     | 59.5-61.0                   | 12             | 10   |
| 13                | SS  |         |  | 64.5-66.0     | 0                      | 70                          |                |      |
| 14                | SS  |         |  | 69.5-71.0     | 12                     | 30                          | 1.8            | 9.8  |
| 60.5              | Till - clay, silty, gray;<br>trace sand and fine gravel | 15      | SS   | 74.5-76.0     | 6                      | 200                         | 9.7            |      |
|                   |   |         |  |               |                        |                             |                |      |
| 67.0              | Sand, gray, fine  |         |  |               |                        |                             |                |      |
| 75.0              | Till - sand, silty, gray,<br>pebbly                     |         |  |               |                        |                             |                |      |
|                   | Bottom of hole @ 75.0'                                  |         |  |               |                        |                             |                |      |

SIZE DISTRIBUTION DATA FOR MCH 43N5E-36.2e

| Cohesive Materials |            |            |                                       |             |             |         |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 1                  | 31.0       | 69.0       | 83                                    | 13          | 4           |         |
| 8                  | 8.0        | 92.0       | 36                                    | 41          | 23          | 2.37    |
| 9                  | 2.0        | 98.0       | 20                                    | 35          | 45          |         |
| 10                 | 3.0        | 97.0       | 21                                    | 35          | 44          | 2.27    |
| 11                 | 3.0        | 97.0       | 41                                    | 35          | 24          |         |
| 12                 | 3.0        | 97.0       | 23                                    | 33          | 44          | 2.17    |
| 14                 | 7.0        | 93.0       | 46                                    | 38          | 16          | 2.41    |

| Noncohesive Materials |                              |      |      |     |      |      |      |     |     |     |     |
|-----------------------|------------------------------|------|------|-----|------|------|------|-----|-----|-----|-----|
| Sample                | Percentage retained on sieve |      |      |     |      |      |      |     |     |     | Pan |
|                       | 4                            | 9    | 16   | 24  | 32   | 42   | 60   | 80  | 115 | 170 |     |
| 2                     | 41.1                         | 16.1 | 11.0 | 4.0 | 6.0  | 6.4  | 6.6  | 2.7 | 1.4 | 0.6 | 4.1 |
| 3                     | 19.1                         | 17.7 | 13.9 | 5.7 | 8.6  | 10.3 | 11.9 | 6.0 | 2.7 | 1.1 | 3.0 |
| 5                     | 32.3                         | 13.1 | 9.0  | 5.5 | 12.2 | 14.9 | 8.2  | 3.0 | 1.2 | 0.3 | 0.3 |
| 7                     | 44.1                         | 17.0 | 11.3 | 6.3 | 9.7  | 6.2  | 2.9  | 1.5 | 0.5 | 0.1 | 0.4 |



Location Detail

610' N of first drive N of airport  
 28' W of Pyott Road  
 28' W, 1250' S of NE<sub>c</sub>, sec. 17  
 Crystal Lake Quadrangle

Fig. 4 - Location of boring MCH 43N8E-17.1g

DRILLING RECORD FOR MCH 43N8E-17.1g

Surface elevation: 895 ft  
Date started: 8-16-62  
Date completed: 10-23-62

Boring method: Hollow auger  
(0-101 ft)  
Hammer weight: 140 pounds  
Hammer drop: 30 inches

Rotary  
(101-213 ft)  
475 pounds  
36 inches

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                   |                             |                |      |
|-------------------|---|---------|------|---------------|-------------------|-----------------------------|----------------|------|
|                   |   | No.     | Type | Depth<br>(ft) | Recovery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 2.0               | *   | 1       | 2S   | 4.5- 6.0      | 14                | 80                          |                |      |
|                   |   | 2       | 2S   | 9.5- 11.0     | 10                | 75                          |                |      |
|                   |   | 3       | 2S   | 14.5- 16.0    | 14                | 33                          |                |      |
|                   |   | 4       | 2S   | 19.5- 21.0    | 14                | 68                          |                |      |
|                   |   | 5       | 2S   | 24.5- 26.0    | 14                | 40                          |                |      |
|                   | Gravel, sandy, brown, fine to coarse; a few cobbles                                     | 6       | 2S   | 29.5- 31.0    | 12                | 46                          |                |      |
|                   |   | 7       | 2S   | 34.5- 36.0    | 2                 | 8                           |                |      |
|                   |   | 8       | SS   | 39.5- 41.0    | 4                 | 7                           |                |      |
|                   |   | 9       | SS   | 44.5- 46.0    | 18                | 15                          | 1.5            | 9.1  |
|                   |   | 10      | SS   | 49.5- 51.0    | 18                | 19                          | 2.0            | 10.8 |
| 34.0              |   | 11      | 2S   | 54.5- 56.0    | 13                | 82                          | 4.5            | 8.2  |
|                   | Till - sand, clayey, silty, gray; a few pebbles; weak                                   | 12      | 2S   | 59.5- 61.0    | 16                | 40                          | 2.3            | 10.6 |
|                   |   | 13      | 2S   | 64.5- 66.0    | 9                 | 38                          | 2.5            | 11.1 |
| 46.0              |   | 14      | 2S   | 69.5- 71.0    | 2                 | 42                          |                |      |
|                   |   | 15      | SS   | 74.5- 76.0    | 6                 | 28                          |                |      |
|                   | Till - sand, silt, clay, pinkish gray-brown; pebbles; sand and gravel seams and pockets | 16      | SS   | 79.5- 81.0    | 6                 | 28                          | 2.0            | 10.6 |
|                   |   | 17      | SS   | 84.5- 86.0    | 18                | 30                          | 3.7            | 10.4 |
|                   |   | 18      | SS   | 89.5- 91.0    | 18                | 24                          | 1.6            | 12.6 |
|                   |   | 19      | SS   | 94.5- 96.0    | 12                | 64                          |                |      |
|                   |   | 20      | SS   | 99.5-101.0    | 6                 | 30                          |                |      |

\* Topsoil, sand, clayey, dark brown

(Continued)

DRILLING RECORD FOR MCH 43N8E-17.1g - Continued

| Depth<br>(1"=10')                  | Description of material | Samples |      |               |                        |                             |                   |
|------------------------------------|-------------------------|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                                    |                         | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| (Description on preceding<br>page) |                         | 21      | 2S   | 105.0-106.5   | 18                     | 32                          | 3.7      11.9     |
|                                    |                         | 22      | 2S   | 110.0-111.5   | 14                     | 54                          | 2.9      9.1      |
|                                    |                         | 23      | 2S   | 115.0-116.5   | 4                      |                             | 11.9              |
|                                    |                         | 24      | 2S   | 120.0-121.5   | 17                     | 37                          | 3.3      12.5     |
|                                    |                         | 25      | 2S   | 125.0-126.5   | 18                     | 83                          | 5.0      9.8      |
|                                    |                         | 26      | 2S   | 130.0-131.5   | Refusal                |                             |                   |
|                                    |                         | 27      | 2S   | 135.0-136.5   | 16                     | 82                          | 5.0      10.3     |
|                                    |                         | 28      | 2S   | 140.0-141.5   | 18                     | 75                          | 5.0      9.9      |
|                                    |                         | 29      | 2S   | 145.0-146.5   | 19                     | 31                          | 5.0      10.5     |
|                                    |                         | 30      | 2S   | 150.0-151.5   | 11                     | 37                          | 3.0               |
|                                    |                         | 31      | 2S   | 155.0-156.5   | 13                     | 72                          | 3.0      10.8     |
|                                    |                         | 32      | 2S   | 160.0-161.5   | 21                     | 34                          | 2.6      11.9     |
|                                    |                         | 33      | 2S   | 165.0-166.5   | 12                     | 44                          | 1.5      11.6     |
|                                    |                         | 34      | 2S   | 170.0-171.5   | 19                     | 38                          | 2.5      11.3     |
|                                    |                         | 35      | 2S   | 175.0-176.5   | 21                     | 37                          | 2.6      12.3     |
|                                    |                         | 36      | 2S   | 180.0-181.5   | 12                     | 34                          | 2.3      12.6     |
|                                    |                         | 37      | 2S   | 185.0-186.5   | 20                     | 37                          | 2.2      12.1     |
|                                    |                         | 38      | 2S   | 190.0-191.5   | 20                     | 42                          | 2.3      12.7     |
|                                    |                         | 39      | 2S   | 195.0-196.5   | 16                     | 39                          | 3.1      11.3     |
|                                    |                         | 40      | 2S   | 200.0-201.5   | 18                     | 41                          | 2.6      11.8     |
|                                    |                         | 41      | 2S   | 206.0-207.0   | 5                      | 89                          |                   |
|                                    |                         | 42      | 2S   | 210.0-211     | Cuttings               |                             |                   |
|                                    |                         | 43      | 2S   | 212 -213      | Cuttings               |                             |                   |

(Continued)



DRILLING RECORD FOR MCH 43N8E-17.1g - Continued

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                        |  |
|-------------------|---|---------|------|---------------|------------------------|--|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer<br>Q <sub>u</sub> MC |
|                   | (Description on page 16)  |         |      |               |                        |  |
| 203.0             |   |         |      |               |                        |  |
| 211.0             | Gravel, sandy, gray-brown;<br>traces of silt and cobbles<br>(outwash); thin interbedded<br>till at 208' (12") |         |      |               |                        |  |
| 212.0             | *   |         |      |               |                        |  |
| 215.0             | **  |         |      |               |                        |  |
|                   | Bottom of hole @ 215.0'   |         |      |               |                        |  |

\* Boulders or broken lime, vuggy (1'); soft gray to white dolomite

\*\* Bedrock, dolomite (cherty), gray to white

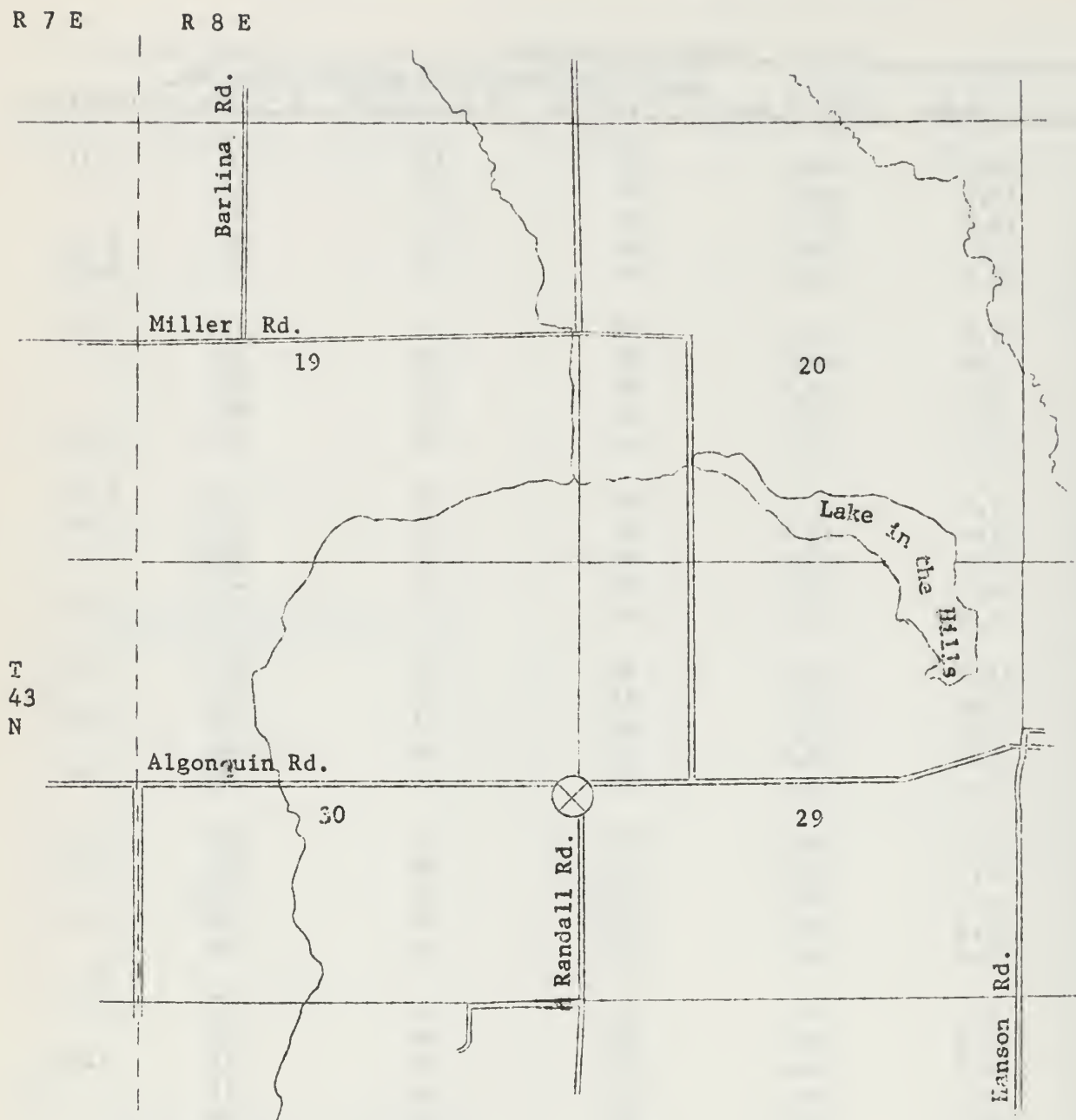
SIZE DISTRIBUTION DATA FOR MCH 43N8E-17.1g

Cohesive Materials

| Sample | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|--------|------------|------------|---------------------------------------|-------------|-------------|---------|
|        |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 4      | 58.0       | 42.0       | 84                                    | 12          | 4           | 2.57    |
| 7      | 11.0       | 89.0       | 45                                    | 37          | 18          |         |
| 9      | 12.0       | 88.0       | 38                                    | 33          | 29          |         |
| 10     | 7.0        | 93.0       | 36                                    | 35          | 29          | 2.32    |
| 11     | 53.0       | 47.0       | 75                                    | 15          | 10          | 2.34    |
| 12     | 3.0        | 97.0       | 29                                    | 44          | 17          | 2.35    |
| 13     | 2.0        | 98.0       | 35                                    | 35          | 30          |         |
| 17     | 4.0        | 96.0       | 48                                    | 29          | 23          |         |
| 18     | 8.0        | 92.0       | 35                                    | 35          | 30          |         |
| 19     | 5.0        | 95.0       | 62                                    | 28          | 10          | 2.39    |
| 20     | 5.0        | 95.0       | 35                                    | 35          | 30          | 2.33    |
| 21     | 7.0        | 93.0       | 34                                    | 36          | 30          | 2.64    |
| 22     | 9.0        | 91.0       | 34.5                                  | 35          | 30.5        |         |
| 24     | 8.0        | 92.0       | 35                                    | 37          | 28          |         |
| 25     | 4.0        | 96.0       | 36                                    | 36          | 28          | 2.41    |
| 27     | 13.0       | 87.0       | 35                                    | 35          | 30          | 2.38    |
| 28     | 7.0        | 93.0       | 34                                    | 37          | 29          |         |
| 29     | 4.0        | 96.0       | 34                                    | 37          | 29          | 2.42    |
| 30     | 9.0        | 91.0       | 36                                    | 34          | 30          |         |
| 31     | 4.0        | 96.0       | 32                                    | 40          | 28          | 2.43    |
| 32     | 4.0        | 96.0       | 32                                    | 39          | 29          |         |
| 33     | 4.0        | 96.0       | 30                                    | 40          | 30          | 2.35    |
| 34     | 4.0        | 96.0       | 32.5                                  | 36          | 31.5        |         |
| 35     | 3.0        | 97.0       | 27                                    | 39          | 34          | 2.37    |
| 36     | 12.0       | 88.0       | 29                                    | 41          | 30          |         |
| 37     | 3.0        | 97.0       | 26                                    | 42          | 32          | 2.34    |
| 38     | 4.0        | 96.0       | 25                                    | 43          | 32          |         |
| 39     | 6.0        | 94.0       | 28                                    | 41          | 31          | 2.33    |
| 40     | 2.0        | 98.0       | 29                                    | 40          | 31          |         |
| 41     | 42.0       | 58.0       | 66                                    | 24          | 10          |         |
| 42     | 33.0       | 67.0       | 56                                    | 24          | 20          |         |

Noncohesive Materials

| Sample | Percentage retained on sieve |      |      |     |     |      |      |     |     |     | Pan |
|--------|------------------------------|------|------|-----|-----|------|------|-----|-----|-----|-----|
|        | 4                            | 9    | 16   | 24  | 32  | 42   | 60   | 80  | 115 | 170 |     |
| 1      | 46.0                         | 16.0 | 11.0 | 4.5 | 5.0 | 4.0  | 3.0  | 1.5 | 1.5 | 1.0 | 6.5 |
| 3      | 30.0                         | 15.0 | 9.5  | 5.0 | 8.0 | 10.5 | 11.0 | 4.5 | 2.0 | 1.0 | 3.5 |
| 6      | 45.0                         | 26.0 | 12.0 | 3.4 | 4.5 | 3.5  | 2.5  | 1.0 | 0.5 | 0.2 | 1.4 |



Location Detail

190' S of cen. line of Algonquin Road  
 22' W of cen. line of Randall Road  
 22' W, 2850' S of NE<sub>C</sub>, sec. 30  
 Crystal Lake Quadrangle



Fig. 5 - Location of boring MCH 43N8E-30.1d

DRILLING RECORD FOR MCH 43N8E-30.1d

Surface elevation: 900 ft  
Date started: 8-15-62  
Date completed: 10-17-62

Boring method: Hollow auger  
(0-101 ft)  
Hammer weight: 140 pounds  
Hammer drop: 30 inches

Rotary  
(101-192.5 ft)  
475 pounds  
36 inches

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                |      |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|----------------|------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 11.0              | Local wash or trans-located<br>till, silt, sandy, gray to<br>brown                                 | 1       | 2S   | 4.5- 6.0      | 6                      | 5                           |                |      |
|                   |  | 2       | 2S   | 9.5- 11.0     | 12                     | 29                          |                |      |
|                   |  | 3       | SS   | 14.5- 16.0    | 8                      | 24                          |                |      |
| 18.0              | Sand, silty, gray, fine to<br>medium; a few pebbles  | 4       | SS   | 19.5- 21.0    | 8                      | 12                          |                |      |
|                   |  | 5       | 2S   | 24.5- 26.0    | 2                      | 18                          |                |      |
| 28.0              | Till - sand, silty, gray;<br>trace clay and gravel   | 6       | SS   | 29.5- 31.0    | 5                      | 12                          |                |      |
|                   |  | 7       | SS   | 34.5- 36.0    | 11                     | 19                          | 3.1            | 10.9 |
|                   |  | 8       | SS   | 39.5- 41.0    | 13                     | 16                          | 2.0            | 11.5 |
|                   |  | 9       | SS   | 44.5- 46.0    | 15                     | 16                          | 2.3            | 10.8 |
|                   |  | 10      | SS   | 49.5- 51.0    | 7                      | 12                          | 0.7            | 14.6 |
|                   |  | 11      | SS   | 54.5- 56.0    | 7                      | 14                          | 0.5            | 13.5 |
|                   |  | 12      | 2S   | 59.5- 61.0    | 10                     | 25                          | 1.2            |      |
|                   |  | 13      | 2S   | 64.5- 66.0    | 18                     | 20                          | 1.7            | 12.0 |
|                   |  | 14      | 2S   | 69.5- 71.0    | 18                     | 30                          | 2.4            | 11.3 |
|                   |  | 15      | 2S   | 74.5- 76.0    | 18                     | 42                          | 4.1            | 10.0 |
|                   | Till - clay, silt, sand,<br>pinkish gray-brown; a few<br>pebbles; grades more pebbly<br>with depth | 16      | 2S   | 79.5- 81.0    | 14                     | 31                          |                |      |
|                   |  | 17      | SS   | 84.5- 86.0    | 14                     | 25                          | 2.2            | 10.9 |
|                   |  | 18      | SS   | 89.5- 91.0    | 9                      | 22                          | 3.3            | 11.5 |
|                   |  | 19      | SS   | 94.5- 96.0    | 17                     | 30                          | 4.1            | 11.0 |
|                   |  | 20      | SS   | 99.5-101.0    | 18                     | 25                          | 3.9            | 11.4 |

(Continued)

DRILLING RECORD FOR MCH 43N8E-30.1d - Continued

| Depth<br>(1"=10') | Description of material            | Samples |      |               |                        |                             |                |      |
|-------------------|------------------------------------|---------|------|---------------|------------------------|-----------------------------|----------------|------|
|                   |                                    | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
|                   |                                    | 21      | 2S   | 105.0-106.5   | 4                      |                             |                |      |
|                   |                                    | 22      | 2S   | 110.0-111.5   | 19                     | 61                          | 5.1            | 9.3  |
|                   |                                    | 23      | 2S   | 115.0-116.5   | 19                     | 70                          | 2.8            | 11.0 |
|                   |                                    | 24      | 2S   | 120.0-121.5   | 18                     |                             | 3.6            | 11.7 |
|                   |                                    | 25      | 2S   | 125.0-126.5   | 4                      | 35                          |                |      |
|                   |                                    | 26      | 2S   | 130.0-131.5   | 18                     | 31                          | 4.1            | 11.4 |
|                   |                                    | 27      | 2S   | 135.0-136.5   | 8                      | 32                          |                | 10.7 |
|                   |                                    | 28      | 2S   | 140.0-141.5   | 17                     | 34                          | 2.2            | 14.4 |
|                   |                                    | 29      | 2S   | 145.0-146.5   | 7                      | 32                          | 4.6            | 11.3 |
|                   |                                    | 30      | 2S   | 150.0-151.5   | 16                     | 98                          | 5.2            | 8.5  |
|                   | (Description on preceding<br>page) | 31      | 2S   | 155.0-156.5   | 18                     | 34                          | 5.2            | 10.5 |
|                   |                                    | 32      | 2S   | 160.0-161.5   | 19                     | 40                          | 3.4            | 10.8 |
|                   |                                    | 33      | 2S   | 165.0-166.5   | 17                     | 75                          |                |      |
|                   |                                    | 34      | 2S   | 170.0-171.5   | 18                     | 70                          |                |      |
|                   |                                    | 35      | 2S   | 175.0-176.5   | 19                     | 44                          |                |      |
|                   |                                    | 36      | 2S   | 180.0-181.5   | 20                     | 34                          |                |      |
|                   |                                    | 37      | 2S   | 185.0-186.5   | 18                     | 42                          | 3.5            |      |
|                   |                                    | 38      |      | 189 -192.5    | Cuttings               |                             |                |      |

(Continued)



DRILLING RECORD FOR MCH 43N8E-30.1d - Continued

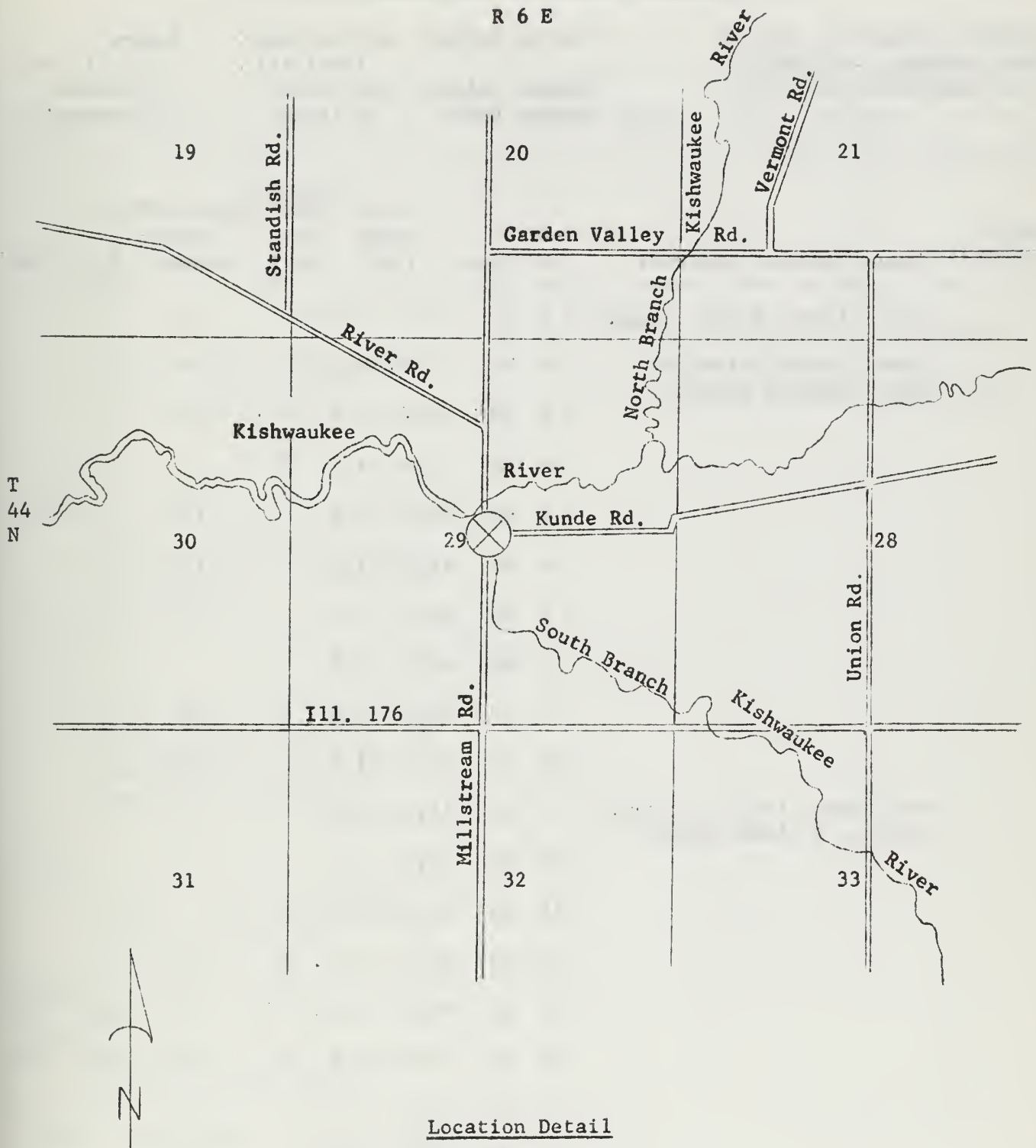
| Depth<br>(1"=10') | Description of material   | No. | Type | Depth<br>(ft) | Samples                |                             |  | Q <sub>u</sub> | MC |
|-------------------|---|-----|------|---------------|------------------------|-----------------------------|--|----------------|----|
|                   |   |     |      |               | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer |  |                |    |
|                   | (Description on page 21)  |     |      |               |                        |                             |  |                |    |
| 158.0             |   |     |      |               |                        |                             |  |                |    |
| 165.0             | Till - silt, clayey, gray;<br>traces of sand and gravel                       |     |      |               |                        |                             |  |                |    |
| 171.0             | *   |     |      |               |                        |                             |  |                |    |
| 173.0             | Silt, sandy, gray   |     |      |               |                        |                             |  |                |    |
| 189.0             | Clay, silty to silt, clayey,<br>green-gray; traces of sand<br>and fine gravel |     |      |               |                        |                             |  |                |    |
| 192.5             | **  |     |      |               |                        |                             |  |                |    |
|                   | Bottom of hole @ 192.5'   |     |      |               |                        |                             |  |                |    |

\* Peat, sedimentary to fibrous, red-brown to black, grading near bottom to black organic silt

\*\* Bedrock, dolomite, white to green-white or vuggy tan; 1' white dolomitic clay on top

SIZE DISTRIBUTION DATA FOR MCH 43N8E-30.1d

| Cohesive Materials |            |            |                                       |             |             |         |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 3                  | 3.0        | 97.0       | 45                                    | 45          | 10          |         |
| 4                  | 11.0       | 89.0       | 50                                    | 38          | 12          |         |
| 7                  | 12.0       | 88.0       | 34                                    | 41          | 25          | 2.43    |
| 8                  | 7.0        | 93.0       | 36                                    | 39          | 25          |         |
| 9                  | 6.0        | 94.0       | 36                                    | 39          | 25          | 2.36    |
| 10                 | 6.0        | 94.0       | 51                                    | 33          | 16          |         |
| 11                 | 7.0        | 93.0       | 34                                    | 41          | 25          | 2.30    |
| 12                 | 4.0        | 96.0       | 35                                    | 37          | 28          |         |
| 13                 | 4.0        | 96.0       | 36                                    | 37          | 27          | 2.34    |
| 14                 | 4.0        | 96.0       | 34                                    | 33          | 33          |         |
| 15                 | 3.0        | 97.0       | 36                                    | 35          | 29          | 2.42    |
| 16                 | 40.0       | 60.0       | 62                                    | 23          | 15          | 2.27    |
| 17                 | 6.0        | 94.0       | 41                                    | 34          | 25          | 2.36    |
| 18                 | 7.0        | 93.0       | 36                                    | 35          | 29          |         |
| 19                 | 8.0        | 92.0       | 35                                    | 38          | 27          | 2.40    |
| 20                 | 3.0        | 97.0       | 36                                    | 35          | 29          |         |
| 22                 | 5.0        | 95.0       | 35                                    | 35          | 30          |         |
| 23                 | 4.0        | 96.0       | 36                                    | 35          | 29          | 2.33    |
| 24                 | 8.0        | 92.0       | 35                                    | 39          | 26          |         |
| 26                 | 3.0        | 97.0       | 33                                    | 38          | 29          | 2.35    |
| 27                 | 5.0        | 95.0       | 34                                    | 38          | 28          |         |
| 28                 | 12.0       | 88.0       | 34                                    | 39          | 27          | 2.40    |
| 29                 | 3.0        | 97.0       | 34                                    | 37          | 29          |         |
| 30                 | 3.0        | 97.0       | 38                                    | 37          | 25          | 2.39    |
| 31                 | 2.0        | 98.0       | 36                                    | 37          | 27          |         |
| 32                 | 3.0        | 97.0       | 30                                    | 43          | 27          | 2.39    |
| 35                 | 2.0        | 98.0       | 24                                    | 50          | 26          |         |
| 36                 | 0.0        | 100.0      | 21                                    | 45          | 34          | 2.23    |
| 37                 | 0.0        | 100.0      | 2                                     | 63          | 35          |         |



Location Detail

110' S of S edge of bridge over  
South Branch Kishwaukee River  
18' W of cen. line of Millstream Road  
2500' E, 2100' N of SW<sub>c</sub>, sec. 29  
Harvard Quadrangle

Fig. 6 - Location of boring MCH 44N6E-29.5d

DRILLING RECORD FOR MCH 44N6E-29.5d

Surface elevation: 810 ft  
Date started: 8-21-62  
Date completed: 10-1-62

Boring method: Hollow auger  
(0-81 ft)  
Hammer weight: 140 pounds  
Hammer drop: 30 inches

Rotary  
(81-127 ft)  
475 pounds  
36 inches

| Depth<br>(1"=10') | Description of material                                   | Samples |      |               |                        |                             |                |          |
|-------------------|---|---------|------|---------------|------------------------|-----------------------------|----------------|----------|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC       |
| 4.5               | Silt, clayey, black, organic                              | 1       | 2S   | 4.5-          | 6.0                    | 14                          | 9              |          |
| 8.0               | Gravel, sandy, black to<br>brown, fine to medium          | 2       | 2S   | 9.5-          | 14.0                   | 6                           | 18             |          |
|                   |   | 3       | 2S   | 14.5-         | 16.0                   | 10                          | 12             |          |
|                   |   | 4       | SS   | 19.5-         | 21.0                   | 0                           | 7              |          |
|                   |   | 5       | SS   | 24.5-         | 26.0                   | 0                           | 19             |          |
|                   |   | 6       | SS   | 29.5-         | 31.0                   | 0                           | 12             |          |
|                   |   | 7       | SS   | 34.5-         | 36.0                   | 0                           | 15             |          |
|                   |   | 8       | SS   | 39.5-         | 41.0                   | 4                           |                |          |
|                   |   | 9       | SS   | 44.5-         | 46.0                   | 6                           | 8              |          |
|                   |   | 10      | SS   | 49.5-         | 51.0                   | 0                           | 75             |          |
|                   | Sand, gray, fine to coarse; a<br>trace to a little gravel | 11      | SS   | 54.5-         | 56.0                   | 0                           | 20             |          |
|                   |   | 12      | SS   | 59.5-         | 61.0                   | 4                           |                |          |
|                   |   | 13      | 2S   | 64.5-         | 66.0                   | 18                          |                |          |
|                   |   | 14      | 2S   | 69.5-         | 71.0                   | 8                           | 40             |          |
|                   |   | 15      | 2S   | 74.5-         | 76.0                   | 12                          | 39             | 4.5 12.0 |
|                   |   | 16      | 2S   | 79.5-         | 81.0                   | 9                           | 60             | 3.8 11.5 |
|                   |   | 17      | 2S   | 85.0-         | 86.5                   |                             | 174            |          |
|                   |   | 18      | 2S   | 90.0-         | 91.5                   | 4                           | 89             |          |
|                   |   | 19      | 2S   | 95.0-         | 96.5                   | 8                           | 67             |          |
|                   |   | 20      | 2S   | 100.0-        | 101.5                  | 18                          | 55             |          |

(Continued)

DRILLING RECORD FOR MCH 44N6E-29.5d - Continued

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                |     |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|----------------|-----|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC  |
| 76.0              | (Description on preceding<br>page)   | 21      | 2S   | 105.0-106.5   | 17                     | 48                          |                |     |
|                   |  | 22      | 2S   | 111.0-112.5   | 16                     | 88                          |                |     |
| 89.0              | Till - silt, sandy, gray; a<br>little clay; pebbles  | 23      | 2S   | 115.0-116.5   | 16                     | 53                          |                |     |
|                   |  | 24      | 2S   | 120.0-121.5   | 14                     | 72                          | 4.8            | 7.2 |
|                   |  | 25      |      | 124 -127      | Cuttings               |                             |                |     |
| 91.0              | *  |         |      |               |                        |                             |                |     |
| 98.0              | Till - silt, clayey, red-<br>brown, very hard; some sand<br>and cobbles                                    |         |      |               |                        |                             |                |     |
| 115.0             | Sand, gray-brown, very fine,<br>well sorted; stratified<br>sand-silt and clay near<br>base; wood particles |         |      |               |                        |                             |                |     |
| 124.0             | Till - sand, silty, red-<br>brown; trace clay  |         |      |               |                        |                             |                |     |
| 127.0             | **   |         |      |               |                        |                             |                |     |
|                   | Bottom of hole @ 127.0'  |         |      |               |                        |                             |                |     |

\* Sand, fine, brown; trace of coarse sand

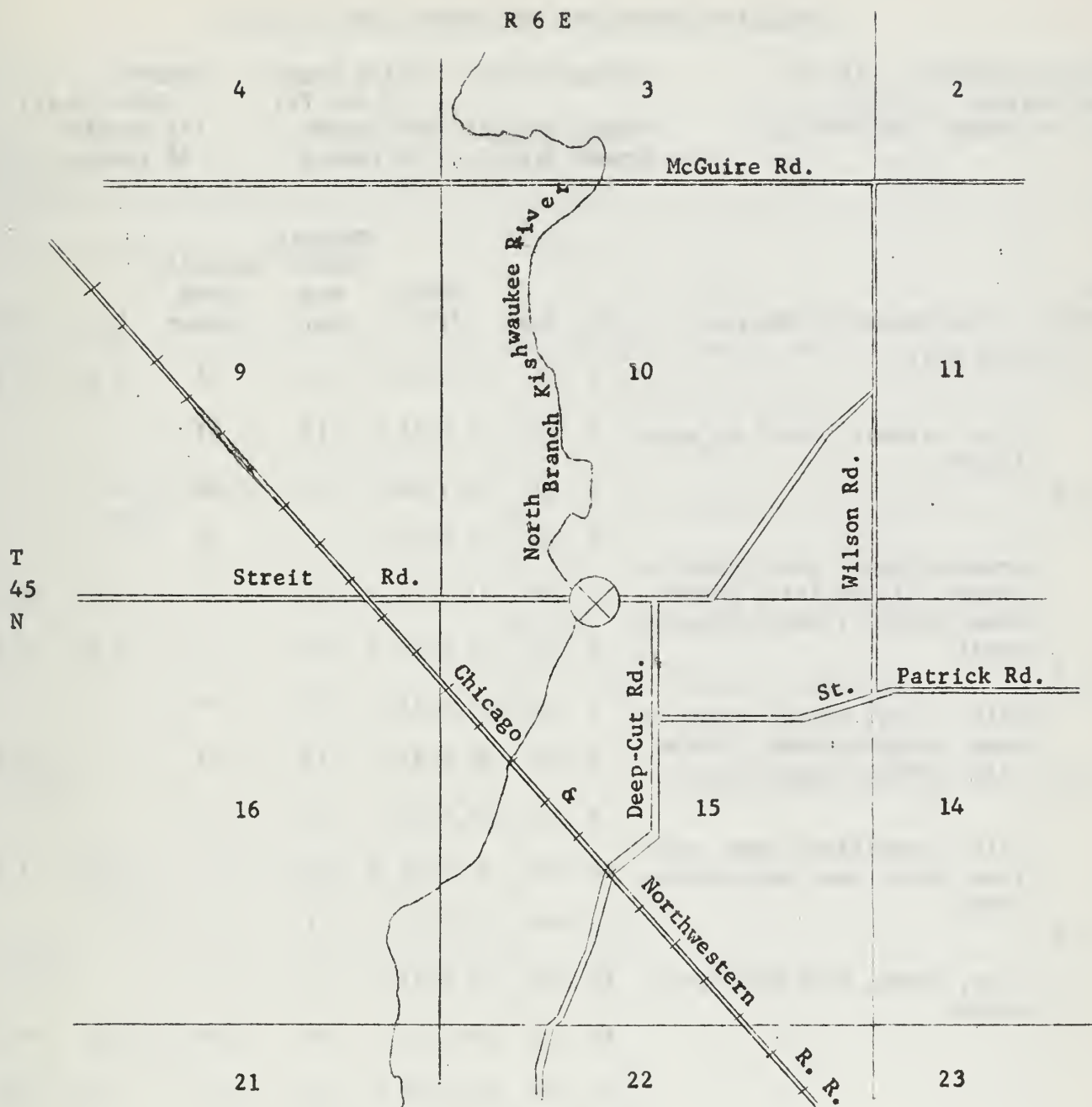
\*\* Bedrock, limestone, dolomitic, white to gray-white, fossiliferous, pyritic, vugular; 9" black, soft, platy shale on top



SIZE DISTRIBUTION DATA FOR MCH 44N6E-29.5d

| Cohesive Materials |            |            |                                       |             |             |         |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 15B                | 3.6        | 96.4       | 33                                    | 37          | 30          |         |
| 16                 | 9.0        | 91.0       | 26                                    | 36          | 38          | 2.35    |
| 18                 | 11.0       | 89.0       | 80                                    | 14          | 6           |         |
| 19                 | 6.0        | 94.0       | 38                                    | 35          | 27          | 2.46    |
| 22                 | 8.5        | 91.5       | 46                                    | 40          | 14          |         |
| 23                 | 12.0       | 88.0       | 62                                    | 22          | 16          | 2.42    |
| 24                 | 8.0        | 92.0       | 42                                    | 34          | 24          | 2.50    |

| Noncohesive Materials |                              |      |      |      |      |      |      |      |      |      |      |
|-----------------------|------------------------------|------|------|------|------|------|------|------|------|------|------|
| Sample                | Percentage retained on sieve |      |      |      |      |      |      |      |      |      | Pan  |
|                       | 4                            | 9    | 16   | 24   | 32   | 42   | 60   | 80   | 115  | 170  |      |
| 3                     | 3.7                          | 12.5 | 17.5 | 11.4 | 21.2 | 17.6 | 9.4  | 3.8  | 1.6  | 0.4  | 0.9  |
| 6                     | 15.0                         | 9.6  | 9.2  | 8.0  | 15.7 | 21.0 | 15.6 | 4.1  | 1.1  | 0.2  | 0.5  |
| 13                    | 12.0                         | 2.3  | 5.5  | 10.4 | 32.3 | 16.5 | 11.4 | 3.4  | 1.0  | 0.4  | 4.8  |
| 20                    | 0.1                          | 0.4  | 0.5  | 0.3  | 0.6  | 2.2  | 20.2 | 25.5 | 23.8 | 10.9 | 15.5 |
| 21                    | 3.7                          | 0.6  | 0.6  | 0.1  | 0.6  | 1.2  | 19.1 | 40.3 | 20.6 | 5.3  | 7.9  |
| 22                    | 1.9                          | 0.7  | 0.3  | 0.0  | 0.0  | 1.2  | 20.1 | 27.5 | 22.2 | 10.2 | 15.9 |



Location Detail

250' E of E edge of bridge over  
North Branch Kishwaukee River  
12' S of Streit Road  
12' S, 1850' E of NW<sub>c</sub>, sec. 15  
Harvard Quadrangle

Fig. 7 - Location of boring MCH 45N6E-15.6h

DRILLING RECORD FOR MCH 45N6E-15.6h

Surface elevation: 910 ft

Date started: 8-28-62

Date completed: 10-5-62

Boring method: Hollow auger  
(0-101 ft)

Hammer weight: 140 pounds

Hammer drop: 30 inches

Rotary  
(101-134 ft)

475 pounds

36 inches

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                        |                             |                |      |
|-------------------|---|---------|------|---------------|------------------------|-----------------------------|----------------|------|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 3.0               | Road fill   | 1       | 2S   | 4.5- 6.0      | 4                      | 3                           | 0.8            | 72.0 |
| 10.0              | Clay, organic, black to gray,<br>fibrous  | 2       | 2S   | 9.5-11.0      | 18                     | 31                          |                |      |
|                   |   | 3       | 2S   | 14.5-16.0     | 6                      | 30                          |                |      |
|                   |   | 4       | 2S   | 19.5-21.0     | 0                      | 12                          |                |      |
| 21.5              | Gravel, sandy, gray, fine to<br>coarse, little silt, grades<br>finer at 20' (fine to coarse<br>sand)                              | 5       | SS   | 21.0-22.5     | 18                     | 8                           | 1.0            | 11.2 |
|                   |   | 6       | SS   | 24.5-26.0     | 12                     | 8                           | 0.8            | 10.1 |
|                   |   | 7       | SS   | 29.5-31.0     | 12                     | 30                          |                |      |
| 27.5              | Till - sand, silty, brown to<br>gray, slightly pink; little<br>clay; pebbly; sand pockets   | 8       | SS   | 32.0-33.5     | 18                     | 23                          |                | 59.0 |
|                   |   | 9       | SS   | 34.5-36.0     | 18                     | 18                          |                |      |
| 37.5              | Silt, stratified; sand, very<br>fine, gray; peat and organic<br>seams   | 10      | SS   | 39.5-41.0     | 18                     | 8                           | 0.8            | 17.3 |
|                   |   | 11      | SS   | 44.5-46.0     | 2                      | 7                           |                |      |
|                   |   | 12      | SS   | 49.5-51.0     | 8                      | 30                          |                |      |
| 42.5              | Clay, sandy, dark blue-gray,<br>sticky  | 13      | 2S   | 54.5-56.0     | 18                     | 32                          | 1.7            | 10.4 |
|                   |   | 14      | 2S   | 59.5-61.0     | 18                     | 43                          | 4.0            | 11.2 |
|                   | Till - silty sand to sand<br>silt clay, light gray; fine<br>to medium sandy gravel layers<br>and pockets; cohesive, trace<br>clay | 15      | 2S   | 64.5-66.0     | 18                     | 37                          | 4.1            | 10.1 |
|                   |   | 16      | 2S   | 69.5-71.0     | 18                     | 29                          | 4.1            | 10.1 |
|                   |   | 17      | 2S   | 74.5-76.0     | 18                     | 33                          | 2.5            | 9.9  |
|                   |   | 18      | 2S   | 79.5-81.0     | 18                     | 37                          | 3.4            | 10.2 |
|                   |   | 19      | 2S   | 84.5-86.0     | 18                     | 35                          | 4.2            | 11.1 |
|                   |   | 20      | 2S   | 89.5-91.0     | 1                      | 57                          |                |      |

(Continued)

DRILLING RECORD FOR MCH 45N6E-15.6h - Continued

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                        |                             |                |      |
|-------------------|---|---------|------|---------------|------------------------|-----------------------------|----------------|------|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 103.0             | (Description on preceding page)   | 21      | 2S   | 94.5- 96.0    | 10                     | 46                          | 3.0            | 11.9 |
|                   |   | 22      | 2S   | 99.5-101.0    | 18                     | 40                          | 2.7            | 12.8 |
|                   |   | 23      | 2S   | 105.0-106.5   | 19                     |                             | 4.8            |      |
|                   |   | 24      | 2S   | 110.0-111.5   | 19                     | 47                          | 4.2            |      |
|                   |   | 25      | 2S   | 115.0-116.5   | 0                      |                             |                |      |
|                   |   | 26      | 2S   | 120.0-121.5   | 5                      | 124                         |                |      |
|                   |   | 27      | 2S   | 125.0-126.5   |                        | 127                         |                |      |
|                   |   | 28      | 2S   | 130.0-131.5   | 64                     | 148                         |                |      |
|                   |   | 29      |      | 130.5-134.0   | Cuttings               |                             |                |      |
| 113.0             | Till - clay, silty, gray-brown; trace of sand and gravel                        |         |      |               |                        |                             |                |      |
| 122.0             | Boulder bed   |         |      |               |                        |                             |                |      |
| 130.5             | Till - sand, silty, brown; trace of clay and a little gravel, cobbles, boulders |         |      |               |                        |                             |                |      |
| 134.0             | *   |         |      |               |                        |                             |                |      |
|                   | Bottom of hole @ 134.0'   |         |      |               |                        |                             |                |      |

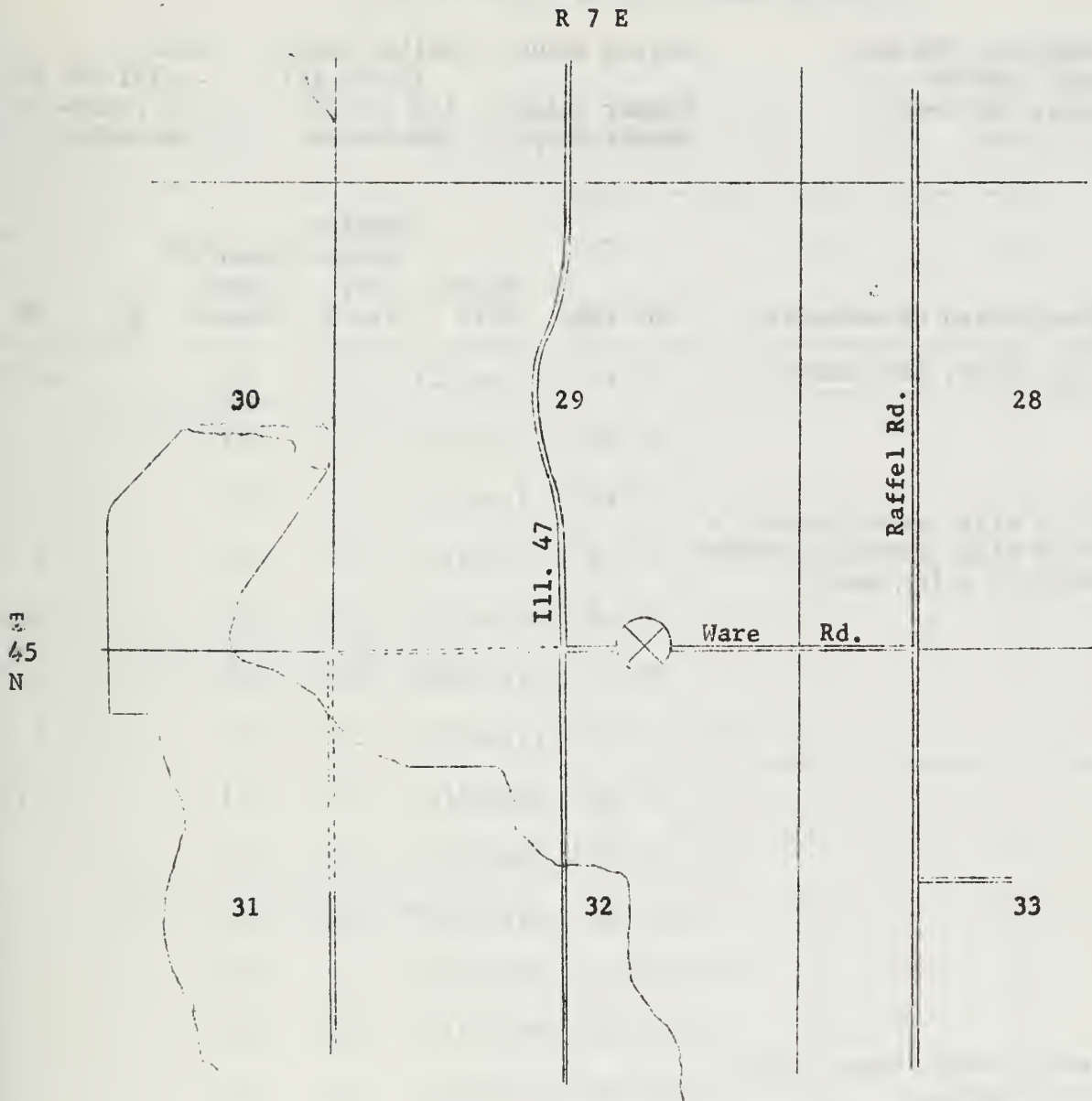
\* Bedrock, dolomite, gray to white to white-green; trace of pyrite and chert; thin bed of white-green shale at 131'

SIZE DISTRIBUTION DATA FOR MCH 45N6E-15.6h

| Cohesive Materials |            |            |                                       |             |             |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |
| 5                  | 7.0        | 93.0       | 49                                    | 34          | 17          |
| 6                  | 14.0       | 86.0       | 50                                    | 38          | 12          |
| 7                  | 0.4        | 99.7       | 41                                    | 54          | 5           |
| 10                 | 0.3        | 99.7       | 44                                    | 30          | 26          |
| 13                 | 6.0        | 94.0       | 39                                    | 43          | 18          |
| 14                 | 3.3        | 96.7       | 31                                    | 41          | 28          |
| 15                 | 5.0        | 95.0       | 43                                    | 38          | 19          |
| 16                 | 6.0        | 94.0       | 43                                    | 35          | 22          |
| 17                 | 36.8       | 63.2       | 54                                    | 29          | 17          |
| 18                 | 8.0        | 92.0       | 47                                    | 34          | 19          |
| 19                 | 5.0        | 95.0       | 38                                    | 36          | 26          |
| 21                 | 4.0        | 96.0       | 36                                    | 34          | 30          |
| 22                 | 4.0        | 96.0       | 30                                    | 34.5        | 35.5        |
| 23                 | 3.1        | 96.9       | 23                                    | 35          | 42          |
| 24                 | 2.0        | 98.0       | 22                                    | 37          | 41          |
| 26                 | 10.0       | 90.0       | 43                                    | 43          | 14          |
| 28                 | 44.6       | 55.4       | 48                                    | 34          | 18          |

| Noncohesive Materials |                              |      |     |     |      |      |     |     |     |     |     |
|-----------------------|------------------------------|------|-----|-----|------|------|-----|-----|-----|-----|-----|
| Sample                | Percentage retained on sieve |      |     |     |      |      |     |     |     |     |     |
|                       | 4                            | 9    | 16  | 24  | 32   | 42   | 60  | 80  | 115 | 170 | Pan |
| 2                     | 63.2                         | 9.9  | 5.4 | 1.6 | 3.6  | 4.0  | 2.0 | 4.1 | 1.5 | 0.8 | 3.7 |
| 3                     | 24.9                         | 19.5 | 9.6 | 6.2 | 10.7 | 10.3 | 9.4 | 4.5 | 3.0 | 1.9 | 0.0 |





Location Detail

896' E of cen. line of Illinois 47  
18' N of cen. line of Ware Road  
18' N, 1800' W of SE<sub>c</sub>, sec. 29  
Woodstock Quadrangle<sup>c</sup>

Fig. 8 - Location of boring MCH 45N7E-29.3a

DRILLING RECORD FOR MCH 45N7E-29.3a

Surface elevation: 885 ft  
Date started: 8-28-62  
Date completed: 10-4-62

Boring method: Hollow auger  
(0-101 ft)  
Hammer weight: 140 pounds  
Hammer drop: 30 inches

Rotary  
(101-169 ft)  
475 pounds  
36 inches

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                   |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| 2.5               | Clay, sandy, dark brown  | 1       | 2S   | 2.0- 3.5      | 10                     | 17                          | 16.2              |
|                   |  | 2       | 2S   | 4.5- 6.0      | 0                      | 25                          |                   |
|                   |  | 3       | 2S   | 7.0- 8.5      | 12                     | 26                          | 11.0              |
|                   | Till - silt, sandy, brown; a<br>little clay; gravelly; cobbles<br>varies to silty sand | 4       | 2S   | 9.5-11.0      | 18                     | 26                          | 9.7               |
|                   |  | 5       | 2S   | 12.0-13.5     | 18                     | 32                          | 9.2               |
|                   |  | 6       | 2S   | 14.5-16.0     | 18                     | 42                          | 8.7               |
| 24.0              |  | 7       | 2S   | 17.0-18.5     | 18                     | 54                          | 9.7               |
|                   |  | 8       | 2S   | 19.5-21.0     | 18                     | 61                          | 9.5               |
|                   |  | 9       | 2S   | 22.0-23.5     | 18                     | 70                          |                   |
|                   |  | 10      | 2S   | 24.5-26.0     | 18                     | 22                          |                   |
|                   |  | 11      | 2S   | 27.0-28.5     | 8                      | 25                          |                   |
|                   |  | 12      | 2S   | 29.5-31.0     | 18                     | 26                          |                   |
|                   | Gravel, sandy, brown, clean,<br>fine to medium   | 13      | 2S   | 32.0-33.5     | 10                     | 25                          |                   |
|                   |  | 14      | SS   | 34.5-36.0     | 10                     | 56                          |                   |
|                   |  | 15      | SS   | 39.5-41.0     | 6                      | 27                          |                   |
|                   |  | 16      | SS   | 44.5-46.0     | 6                      | 27                          |                   |
|                   |  | 17      | SS   | 49.5-51.0     | 10                     | 22                          |                   |
|                   |  | 18      | SS   | 54.5-56.0     | 4                      | 28                          |                   |
| 63.0              |  | 19      | SS   | 59.5-61.0     |                        | 60                          |                   |
|                   | Sand, gray, fine to medium   | 20      | SS   | 64.5-66.0     | 14                     | 29                          |                   |
| 71.0              |  |         |      |               |                        |                             |                   |

(Continued)

DRILLING RECORD FOR MCH 45N7E-29.3a - Continued

| Depth<br>(1"=10') | Description of materials   | Samples |      |               |                        |                             |                   |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| 95.5              | Sand, gravelly, gray, fine to coarse   | 21      | SS   | 69.5- 71.0    | 4                      | 28                          |                   |
|                   |  | 22      | SS   | 74.5- 76.0    | 18                     | 52                          |                   |
|                   |  | 23      | SS   | 79.5- 81.0    | 8                      | 21                          |                   |
|                   |  | 24      | SS   | 84.5- 86.0    |                        |                             |                   |
|                   |  | 25      | SS   | 89.5- 91.0    | 15                     | 60                          |                   |
|                   |  | 26      | SS   | 94.5- 96.0    | 0                      | 15                          |                   |
|                   |  | 27      | SS   | 97.0- 98.5    | 6                      | 15                          |                   |
|                   |  | 28      | SS   | 99.5-101.0    |                        | 65                          |                   |
| 98.0              | Till - sand, silt, clay, pinkish gray; sand layers   | 29      | 2S   | 105.0-106.5   | 4                      | 53                          |                   |
| 127.0             | Gravel, sandy, gray, fine to medium; a few cobbles   | 30      | 2S   | 110.0-111.5   | 6                      |                             |                   |
|                   |  | 31      | 2S   | 115.0-116.5   | 18                     | 117                         |                   |
|                   |  | 32      | 2S   | 120.0-121.5   | 18                     | 106                         |                   |
|                   |  | 33      | 2S   | 125.0-126.5   | 14                     | 128                         |                   |
|                   |  | 34      | 2S   | 130.0-131.5   | 18                     | 48                          |                   |
|                   |  | 35      | 2S   | 135.0-136.5   | 16                     | 45                          |                   |
|                   |  | 36      | 2S   | 140.0-141.5   | 16                     | 37                          |                   |
|                   |  | 37      | 2S   | 145.0-146.5   | 16                     | 70                          |                   |
| 138.0             | Sand, silty, gray; a little gravel and a few cobbles; thin sand lenses scattered; trace clay | 38      | 2S   | 150.0-151.5   | 8                      | 50                          |                   |
|                   |  | 39      | 2S   | 155.0-156.5   | 16                     | 83                          |                   |
|                   |  | 40      | 2S   | 160.0-161.5   | 20                     |                             | 5.2               |
| 146.0             | Till - silt, clayey, dark red-brown; a little sand   | 41      | 2S   | 165.0-166.5   | 6                      | 137                         |                   |
|                   |  | 42      |      | 166 -169      | Cuttings               |                             |                   |

(Continued)

DRILLING RECORD FOR MCH 45N7E-29.3a - Continued

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                        |                             |                   |
|-------------------|---|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| 153.0             | Gravel, sandy, clayey; a trace of cobbles; separated from till by 1' or 2' fine gray-brown sand |         |      |               |                        |                             |                   |
| 165.0             | Till - sand, clayey, gray-brown; medium to coarse sand and gravel                               |         |      |               |                        |                             |                   |
| 166.5             | *   |         |      |               |                        |                             |                   |
| 169.0             | **  |         |      |               |                        |                             |                   |
|                   | Bottom of hole @ 169.0'   |         |      |               |                        |                             |                   |

\* Sand and gravel, gray, dolomitic

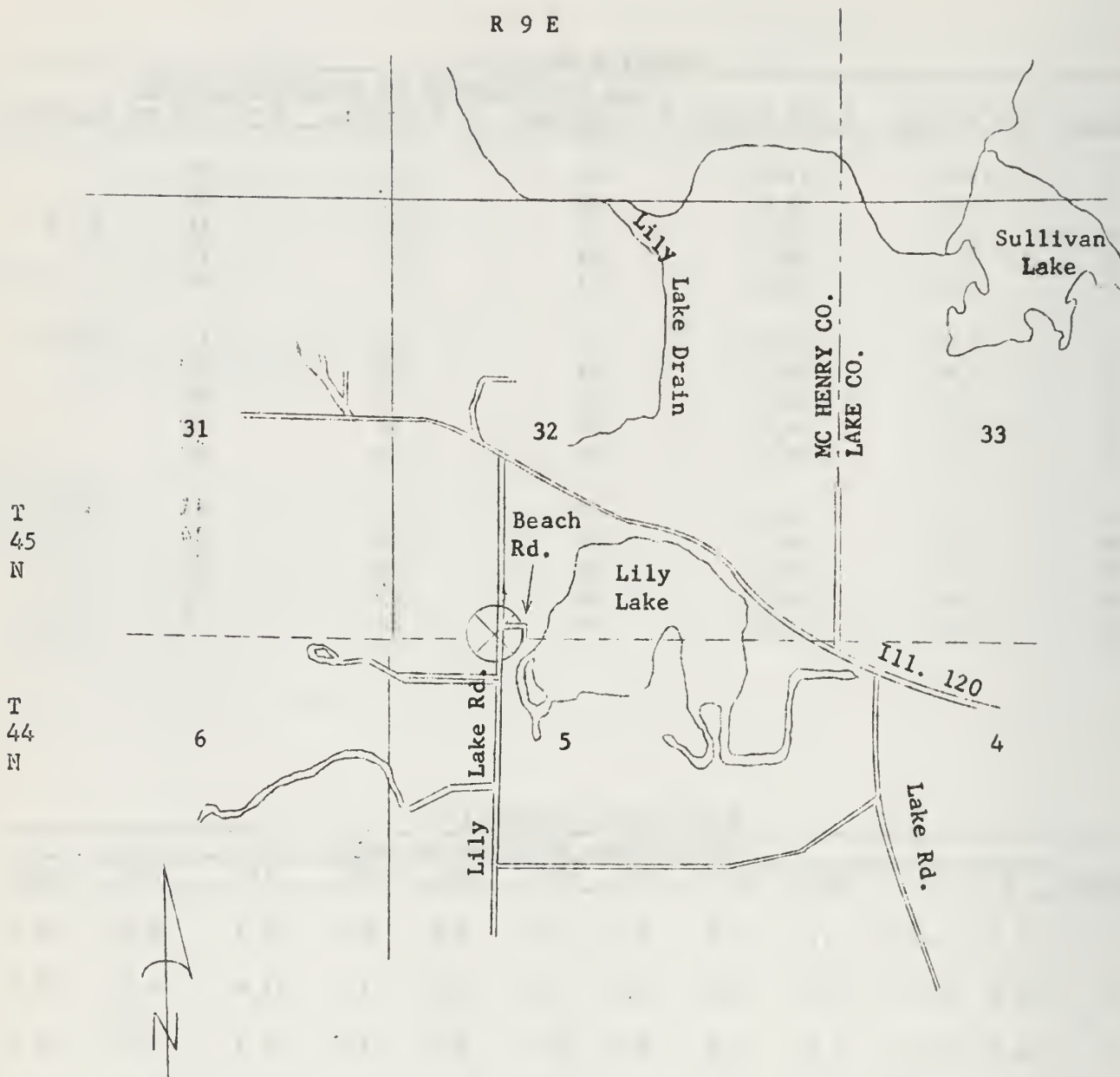
\*\* Bedrock, dolomite, white to gray-white

SIZE DISTRIBUTION DATA FOR MCH 45N7E-29.3a

| Cohesive Materials |            |            |                                       |             |             |         |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 1                  | 13.0       | 87.0       | 40                                    | 39          | 21          |         |
| 3                  | 5.0        | 95.0       | 43                                    | 37          | 20          |         |
| 4                  | 8.0        | 92.0       | 42                                    | 42          | 16          | 2.44    |
| 5                  | 7.0        | 93.0       | 42                                    | 39          | 19          |         |
| 6                  | 7.0        | 93.0       | 41                                    | 39          | 20          |         |
| 7                  | 5.0        | 95.0       | 42                                    | 41          | 17          | 2.33    |
| 8                  | 8.0        | 92.0       | 41                                    | 40          | 19          |         |
| 27                 | 9.0        | 91.0       | 61                                    | 20          | 19          |         |
| 33                 | 4.0        | 96.0       | 36                                    | 36          | 28          |         |
| 34                 | 6.0        | 94.0       | 49                                    | 35          | 16          |         |
| 35                 | 4.0        | 96.0       | 42                                    | 47          | 11          | 2.36    |
| 36                 | 6.0        | 94.0       | 57                                    | 29          | 14          |         |
| 39                 | 12.0       | 88.0       | 57                                    | 28          | 15          | 2.46    |
| 40                 | 5.0        | 95.0       | 54                                    | 30          | 16          |         |
| 41                 | 50.0       | 50.0       | 64                                    | 36          | 0           | 2.43    |

| Noncohesive Materials |                              |      |      |     |     |     |      |     |     |     |     |
|-----------------------|------------------------------|------|------|-----|-----|-----|------|-----|-----|-----|-----|
| Sample                | Percentage retained on sieve |      |      |     |     |     |      |     |     |     | Pan |
|                       | 4                            | 9    | 16   | 24  | 32  | 42  | 60   | 80  | 115 | 170 |     |
| 11                    | 56.5                         | 9.6  | 7.1  | 3.5 | 5.2 | 5.0 | 6.0  | 2.4 | 1.1 | 0.4 | 3.2 |
| 14                    | 38.8                         | 27.2 | 11.4 | 3.2 | 4.4 | 4.4 | 4.0  | 1.7 | 1.0 | 0.6 | 3.3 |
| 18                    | 46.8                         | 20.0 | 9.5  | 3.0 | 4.0 | 4.2 | 3.8  | 2.0 | 1.2 | 0.9 | 4.6 |
| 22                    | 18.7                         | 15.2 | 12.0 | 5.8 | 7.3 | 8.3 | 12.4 | 6.3 | 3.6 | 1.9 | 8.5 |
| 29                    | 45.4                         | 15.7 | 9.2  | 3.0 | 3.8 | 4.6 | 7.7  | 2.5 | 1.6 | 1.0 | 5.5 |
| 32                    | 46.0                         | 16.8 | 10.5 | 4.7 | 5.6 | 4.2 | 2.5  | 1.4 | 1.5 | 1.0 | 5.8 |





Location Detail

122' S of Beach Road .  
13' W of Lily Lake Road  
1150' E, 500' N of SW<sub>C</sub>, sec. 32  
Wauconda Quadrangle

Fig. 9 - Location of boring MCH 45N9E-32.7a

DRILLING RECORD FOR MCH 45N9E-32.7a

Surface elevation: 760 ft

Date started: 9-6-62

Date completed: 10-12-62

Boring method: Hollow auger  
(0-86 ft)

Hammer weight: 140 pounds

Hammer drop: 30 inches

Rotary  
(86-156 ft)

475 pounds

36 inches

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                |    |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|----------------|----|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC |
| 2.0               | Sand, clayey, dark brown   | 1       | 2S   | 4.5- 6.0      | 18                     | 15                          |                |    |
| 20.0              | Sand, brown, fine to medium;<br>trace gravel; stratified                       | 2       | 2S   | 9.5-11.0      | 18                     | 17                          |                |    |
|                   |  | 3       | 2S   | 14.5-16.0     | 18                     | 17                          |                |    |
|                   |  | 4       | 2S   | 19.5-21.0     | 8                      | 16                          |                |    |
|                   |  | 5       | 2S   | 24.5-26.0     | 8                      | 16                          |                |    |
|                   |  | 6       | 2S   | 29.5-31.0     | 18                     | 21                          |                |    |
| 25.0              | Sand, gravelly, brown, medium<br>to coarse                                     | 7       | 2S   | 34.5-36.0     | 10                     | 20                          |                |    |
|                   |  | 8       | 2S   | 39.5-41.0     | 0                      | 43                          |                |    |
| 35.5              | Sand, gray, fine to medium; a<br>little gravel in lower por-<br>tion           | 9       | 2S   | 44.5-46.0     | 0                      | 22                          |                |    |
|                   |  | 10      | 2S   | 49.5-51.0     | 0                      | 18                          |                |    |
|                   |  | 11      | 2S   | 54.5-56.0     | 0                      | 19                          |                |    |
| 39.5              | Gravel, sandy, gray, medium<br>to coarse; silty seams; cobbly                  | 12      | SS   | 59.5-61.0     | 4                      | 23                          |                |    |
| 58.0              | Sand, gray, fine to coarse;<br>interbedded with fine to<br>coarse sandy gravel | 13      | W    | 54.5-59.5     |                        |                             |                |    |
|                   |  | 14      | SS   | 64.5-66.0     | 6                      | 61                          |                |    |
|                   |  | 15      | SS   | 69.5-71.0     | 4                      | 52                          |                |    |
|                   |  | 16      | 2S   | 74.5-76.0     | 0                      | 55                          |                |    |
|                   |  | 17      | 2S   | 79.5-81.0     | 0                      | 35                          |                |    |
|                   |  | 18      | SS   | 84.5-86.0     | 6                      | 38                          |                |    |
|                   |  | 19      | 2S   | 90.0-91.5     | 5                      | 98                          |                |    |
|                   |  | 20      | 2S   | 95.0-96.5     | 10                     | 104                         |                |    |

(Continued)

DRILLING RECORD FOR MCH 45N9E-32.7a -- Continued

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                   |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| 90.0              | (Description on preceding page)  | 21      | 2S   | 100.0-101.5   | 2                      | 72                          |                   |
|                   |  | 22      | 2S   | 105.0-106.5   | 14                     |                             |                   |
|                   |  | 23      | 2S   | 110.0-111.5   | 12                     | 112                         |                   |
|                   |  | 24      | 2S   | 115.0-116.5   | 12                     |                             |                   |
|                   |  | 25      | 2S   | 120.0-121.5   | 10                     |                             |                   |
|                   |  | 26      | 2S   | 125.0-126.5   | 0                      | 171                         |                   |
|                   |  | 27      | 2S   | 130.0-131.5   | 5                      | 158                         |                   |
| 103.0             | Sand, gray, very fine; a trace to a little fine gravel near top; some wood particles found in place in sample 20   | 28      | 2S   | 135.0-136.5   | 6                      | 159                         |                   |
|                   |  | 29      | 2S   | 140.0-141.5   | 8                      |                             |                   |
|                   |  | 30      | 2S   | 145.0-146.5   | 0                      | Refusal                     |                   |
|                   |  | 31      | 2S   | 150.0-151.5   | 10                     | 140                         |                   |
| 114.0             | Gravel, sandy, gray; trace of clay and silt and cobbles; clay fraction increases in streaks  | 32      |      | 150.8-156.0   | Cuttings               |                             |                   |
| 128.0             | Sand, gray, medium; a trace to a little gravel   |         |      |               |                        |                             |                   |
|                   | Boulders, sand and gravel; boulders predominantly carbonates (dolomites and some limestone) with gray-white sandy silty gravel; gravel is angular; no sorting apparent; thin lenses of red-brown till (sandy silty clay) |         |      |               |                        |                             |                   |

(Continued)

DRILLING RECORD FOR MCH 45N9E-32.7a - Continued

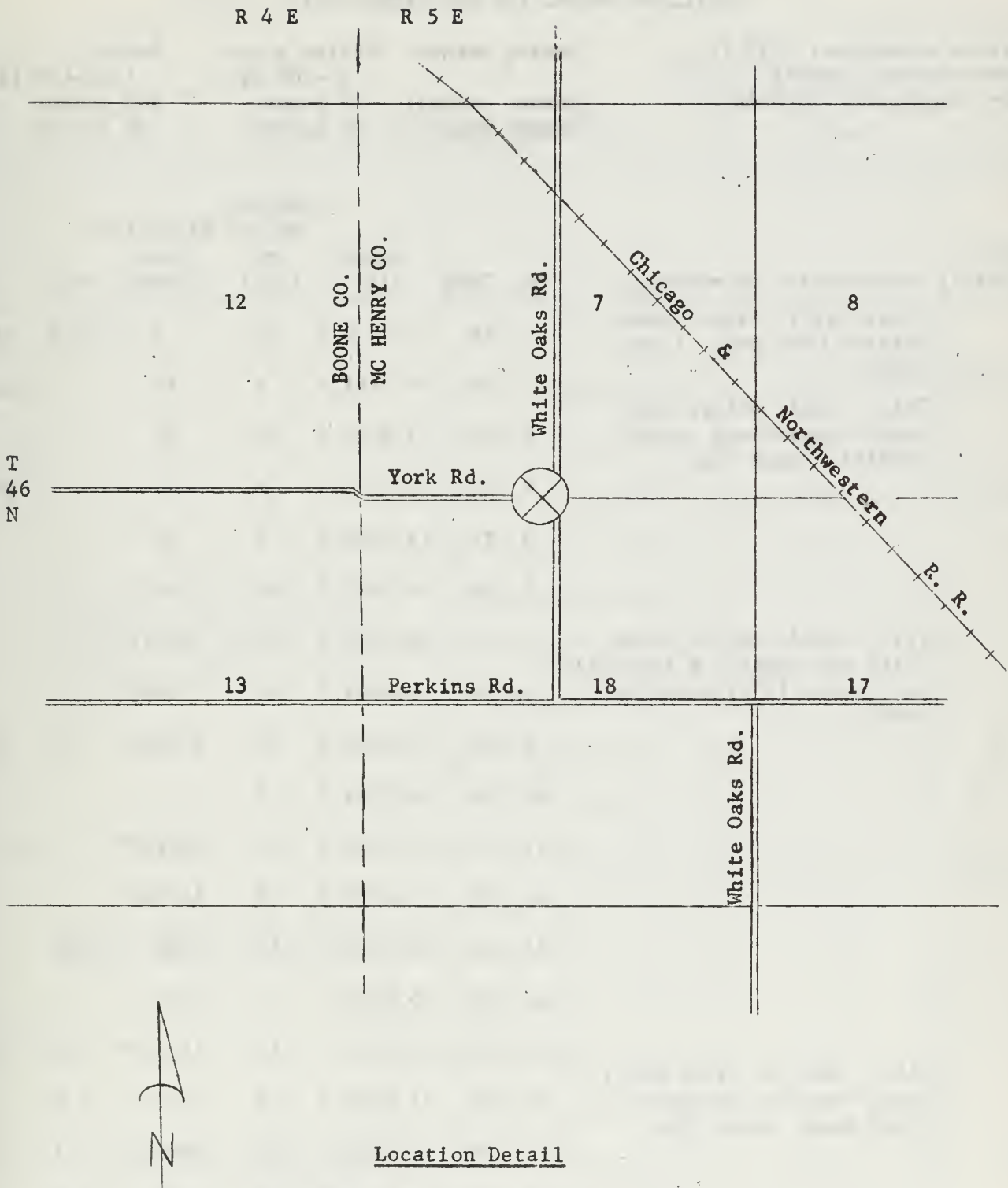
| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                   |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| 150.8             | (Description on preceding page)  |         |      |               |                        |                             |                   |
| 156.0             | Bedrock, dolomite, white to gray to green-gray, limey; beds of white chert |         |      |               |                        |                             |                   |
|                   | Bottom of hole @ 156.0'  |         |      |               |                        |                             |                   |

SIZE DISTRIBUTION DATA FOR MCH 45N9E-32.7a

| Cohesive Materials |            |            |                                       |             |             |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |
| 31                 | 14.0       | 86.0       | 22                                    | 62          | 16          |

| Noncohesive Materials |                              |      |      |      |      |      |      |      |      |      |      |
|-----------------------|------------------------------|------|------|------|------|------|------|------|------|------|------|
| Sample                | Percentage retained on sieve |      |      |      |      |      |      |      |      |      |      |
|                       | 4                            | 9    | 16   | 24   | 32   | 42   | 60   | 80   | 115  | 170  | Pan  |
| 1                     | 5.9                          | 5.5  | 6.9  | 4.6  | 10.6 | 21.7 | 29.8 | 8.5  | 2.7  | 0.9  | 2.9  |
| 2                     | 0.0                          | 0.2  | 0.3  | 0.3  | 1.0  | 4.4  | 22.6 | 30.8 | 22.9 | 9.5  | 8.0  |
| 3                     | 16.5                         | 8.0  | 11.1 | 7.5  | 15.0 | 19.1 | 16.0 | 3.7  | 1.3  | 0.4  | 1.4  |
| 4                     | 24.6                         | 18.1 | 13.8 | 5.8  | 8.4  | 10.4 | 9.5  | 3.0  | 1.3  | 0.9  | 4.2  |
| 5                     | 77.0                         | 8.6  | 4.7  | 1.6  | 1.9  | 1.6  | 1.4  | 0.5  | 0.3  | 0.3  | 2.1  |
| 6                     | 2.0                          | 3.9  | 3.6  | 1.5  | 2.7  | 5.1  | 18.2 | 25.4 | 20.4 | 9.1  | 8.1  |
| 7                     | 16.2                         | 7.2  | 9.7  | 4.6  | 7.1  | 9.3  | 13.6 | 10.8 | 7.9  | 4.2  | 9.4  |
| 9                     | 0.0                          | 3.7  | 12.4 | 7.1  | 13.1 | 21.2 | 28.5 | 10.1 | 3.3  | 0.6  | 0.0  |
| 10                    | 0.4                          | 14.4 | 33.3 | 14.4 | 16.2 | 10.2 | 6.2  | 2.3  | 1.3  | 0.5  | 0.8  |
| 11                    | 0.0                          | 15.4 | 27.8 | 13.4 | 19.3 | 13.8 | 6.8  | 2.0  | 0.8  | 0.3  | 0.4  |
| 12                    | 53.8                         | 12.2 | 11.0 | 4.8  | 6.9  | 5.2  | 3.0  | 0.9  | 0.6  | 0.3  | 1.3  |
| 14                    | 50.5                         | 19.5 | 9.3  | 3.2  | 3.8  | 3.2  | 2.6  | 1.6  | 1.4  | 1.1  | 3.8  |
| 15                    | 50.3                         | 20.2 | 12.9 | 4.2  | 4.4  | 2.7  | 1.9  | 0.9  | 0.8  | 0.4  | 1.3  |
| 17                    | 0.0                          | 4.7  | 16.6 | 6.1  | 9.0  | 23.9 | 22.2 | 12.6 | 3.7  | 0.7  | 0.5  |
| 18                    | 17.3                         | 0.5  | 2.0  | 3.0  | 10.0 | 19.4 | 22.0 | 9.8  | 5.0  | 2.4  | 8.6  |
| 19                    | 1.9                          | 2.3  | 1.7  | 1.2  | 3.1  | 5.8  | 8.8  | 21.5 | 34.1 | 10.7 | 8.9  |
| 20                    | 0.9                          | 0.4  | 1.3  | 1.6  | 17.9 | 26.6 | 26.4 | 11.5 | 7.6  | 2.8  | 3.0  |
| 21                    | 41.7                         | 1.8  | 1.7  | 0.9  | 3.3  | 8.6  | 15.9 | 8.6  | 6.2  | 2.9  | 8.4  |
| 22                    | 21.3                         | 12.8 | 16.1 | 7.8  | 9.9  | 8.2  | 8.3  | 4.4  | 3.1  | 1.8  | 6.3  |
| 23                    | 44.9                         | 12.2 | 8.0  | 2.9  | 4.4  | 4.5  | 5.7  | 4.0  | 3.4  | 2.0  | 8.0  |
| 24                    | 21.8                         | 6.0  | 11.7 | 7.2  | 12.8 | 13.5 | 12.4 | 4.9  | 2.8  | 1.6  | 5.3  |
| 25                    | 70.0                         | 9.2  | 4.6  | 1.6  | 5.9  | 1.5  | 1.5  | 0.9  | 0.8  | 0.6  | 3.4  |
| 27                    | 59.7                         | 13.7 | 6.5  | 2.3  | 3.4  | 2.8  | 2.8  | 1.7  | 1.4  | 1.0  | 4.7  |
| 28                    | 21.1                         | 21.4 | 15.5 | 5.3  | 6.1  | 4.5  | 4.4  | 2.9  | 2.9  | 2.3  | 13.6 |
| 29                    | 45.6                         | 23.0 | 11.6 | 3.2  | 3.0  | 2.2  | 2.0  | 1.4  | 1.3  | 1.1  | 5.6  |
| 32                    | 18.1                         | 45.2 | 32.6 | 1.8  | 0.6  | 0.3  | 0.2  | 0.1  | 0.1  | 0.1  | 0.9  |





17' N of cen. line of York Road  
 146' W of cen. line of White Oaks Road  
 17' N, 2800' W of SE<sub>c</sub>, sec. 7  
 Harvard Quadrangle

Fig. 10 - Location of boring MCH 46N5E-7.5a

DRILLING RECORD FOR MCH 46N5E-7.5a

Surface elevation: 975 ft  
Date started: 8-9-62  
Date completed: 9-10-62

Boring method: Hollow auger  
(0-101 ft)  
Hammer weight: 140 pounds  
Hammer drop: 30 inches

Rotary  
(101-475 ft)  
475 pounds  
36 inches

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                        |                             |                |      |
|-------------------|---|---------|------|---------------|------------------------|-----------------------------|----------------|------|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 5.5               | Clay, silty, light brown, mottled with gray (local wash)                                    | 1       | 2S   | 5.0-6.5       | 16                     | 8                           | 0.6            | 73.0 |
|                   |   | 2       | 2S   | 10.0-11.5     | 8                      | 14                          |                | 12.2 |
| 13.0              | Till - sand, silty, red-brown; occasional cobble; pebbles; trace clay                       | 3       | 2S   | 15.0-16.5     | 10                     | 32                          |                |      |
|                   |   | 4       | 2S   | 20.0-21.5     | 14                     | 41                          |                | 10.8 |
|                   |   | 5       | 2S   | 25.0-26.5     | 8                      | 59                          |                |      |
|                   |   | 6       | 2S   | 30.0-31.5     | 18                     | 140                         |                |      |
| 37.5              | Till - sand, yellow-brown, silty and pebbly; a few clean wet layers (6"); occasional cobble | 7       | 2S   | 35.0-36.5     | 12                     | 60/12"                      |                |      |
|                   |   | 8       | 2S   | 40.0-41.5     | 14                     | 50/14"                      |                |      |
|                   |   | 9       | 2S   | 45.0-46.5     | 16                     | 175/16"                     | 4.5+           | 7.7  |
|                   |   | 10      | 2S   | 50.0-51.5     | 0                      |                             |                |      |
|                   |   | 11      | SS   | 52.5-54.0     | 12                     | 100/12"                     |                |      |
|                   |   | 12      | SS   | 55.0-56.5     | 13                     | 116/14"                     |                |      |
|                   |   | 13      | SS   | 60.0-61.5     | 18                     | 104                         | 4.5            |      |
|                   |   | 14      | SS   | 65.0-66.5     | 6                      | 118                         |                |      |
|                   |   | 15      | SS   | 70.0-71.5     | 15                     | 150/15"                     | 4.4            | 9.3  |
|                   |   | 16      | SS   | 75.0-76.5     | 18                     | 200                         | 4.6            | 9.8  |
|                   | Till - sand to silty sand, gray, compact; layers of clean sand; trace clay                  | 17      | SS   | 80.0-81.5     | 12                     | 230/12"                     | 3.3            | 10.3 |
|                   |   | 18      | SS   | 85.0-86.5     | 18                     | 118                         | 5.2            | 8.2  |
|                   |   | 19      | SS   | 90.0-91.5     | 12                     | 35                          |                |      |
|                   |   | 20      | SS   | 95.0-96.5     | 12                     | 200                         |                |      |

(Continued)

DRILLING RECORD FOR MCH 46N5E-7.5a - Continued

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                   |                             |                |      |
|-------------------|--|---------|------|---------------|-------------------|-----------------------------|----------------|------|
|                   |  | No.     | Type | Depth<br>(ft) | Recovery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 88.0              | (Description on preceding page)  | 21      | SS   |               | 18                | 155                         |                |      |
|                   |  | 22      | 2S   | 105.0-106.5   | 6                 |                             |                |      |
|                   |  | 23      | 2S   | 110.0-111.5   | 0                 |                             |                |      |
|                   |  | 24      | 2S   | 115.0-116.5   | 0                 |                             | 5.2            |      |
|                   |  | 25      | 2S   | 120.0-121.5   | 14                | 104                         | 5.2+           | 8.0  |
|                   |  | 26      | 2S   | 125.0-126.5   | 12                | 134                         | 3.4            | 19.4 |
| 113.0             | Sand and gravel, gray; layers of fine sand interbedded with fine to coarse gravel, cobbles, few silty layers         | 27      | 2S   | 130.0-131.5   | 10                | 137                         | 5.2            | 16.6 |
|                   |  | 28      | 2S   | 135.0-136.5   | 18                | 76                          |                | 18.3 |
|                   |  | 29      | 2S   | 140.0-141.5   | 18                | 85                          | 3.8            | 19.1 |
|                   |  | 30      | 2S   | 145.0-146.5   | 18                | 81                          | 3.3            | 18.6 |
|                   |  | 31      | 2S   | 150.0-151.5   | 18                | 87                          | 4.1            | 17.3 |
|                   |  | 32      | 2S   | 155.0-156.5   | 18                | 90                          | 4.8            | 36.0 |
|                   |  | 33      | 2S   | 160.0-161.5   | 18                |                             | 3.4            | 20.6 |
| 126.0             | Sand, silty, gray-brown; gravel lenses; trace clay   | 34      | 2S   | 165.0-166.5   | 18                | 77                          |                |      |
|                   |  | 35      | 2S   | 170.0-171.5   | 18                | 88                          |                | 19.8 |
|                   |  | 36      | 2S   | 175.0-176.5   | 10                | 97                          |                | 21.0 |
|                   |  | 37      | 2S   | 180.0-181.5   | 18                | 75                          | 2.9            | 9.7  |
|                   |  | 38      | 2S   | 185.0-186.5   | 12                | 117                         | 2.5            | 10.6 |
|                   |  | 39      | 2S   | 190.0-191.5   | 12                |                             |                |      |
|                   |  | 40      | 2S   | 195.0-196.5   | 18                | 115                         | 4.8            | 9.7  |
|                   | Silt, clayey, gray; speckled and massive to stratified with seams of very fine sand; massive tends to have more clay | 41      | 2S   | 200.0-201.5   | 3                 | 30                          |                |      |
|                   |  | 42      | 2S   | 205.0-206.5   | 18                |                             |                | 10.6 |
|                   |  | 43      | 2S   | 210.0-211.5   | 12                |                             | 5.2+           | 13.8 |

(Continued)

DRILLING RECORD FOR MCH 46N5E-7.5a - Continued

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                   |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| 176.0             | (Description on preceding page)  | 44      | 2S   | 215.0-216.5   | 18                     | 162                         | 9.8               |
|                   |  | 45      | 2S   | 220.0-221.5   | 14                     | 210                         | 5.2+ 13.8         |
|                   |  | 46      | 2S   | 225.0-226.5   | 12                     | 191                         |                   |
|                   |  | 47      | 2S   | 230.0-231.5   | 12                     | 115                         | 3.8 19.1          |
|                   |  | 48      | 2S   | 235.0-236.5   | 12                     | 212                         |                   |
|                   |  | 49      | 2S   | 240.0-241.5   | 14                     | 188                         |                   |
|                   |  | 50      | 2S   | 245.0-246.5   | 12                     | 178                         |                   |
|                   |  | 51      | 2S   | 250.0-251.5   | 10                     |                             |                   |
|                   |  | 52      | 2S   | 255.0-256.0   | 8                      |                             |                   |
|                   |  | 53      | 2S   | 260.0-261.0   | 8                      |                             |                   |
| 210.0             | Till - silt, clayey, gray-brown, stiff; some sand and medium gravel; also contains sand seams, silt seams, and cobble layers | 54      | 2S   | 265.0-266.0   | 4                      |                             |                   |
|                   |  | 55      | 2S   | 270.0-271.5   | 12                     |                             |                   |
|                   |  | 55A     | 2S   | 275.0-276.5   | 16                     | 151                         | 5.2+ 8.2          |
|                   |  | 56      | 2S   | 280.0-281.5   | 18                     | 132                         | 5.2+ 7.4          |
|                   |  | 57      | 2S   | 285.0-286.5   | 6                      |                             |                   |
|                   |  | 58      | 2S   | 290.0-291.5   | 12                     | 173                         | 5.2+ 7.8          |
|                   |  | 59      | 2S   | 295.0-296.5   | 14                     | 184                         | 5.2+ 8.0          |
|                   |  | 60      | 2S   | 300.0-301.5   | 18                     |                             | 5.2+ 7.6          |
|                   |  | 61      | 2S   | 305.0-306.5   | 16                     |                             | 5.2+ 8.8          |
|                   |  | 62      | 2S   | 310.0-311.5   | 16                     |                             | 5.2+              |
|                   |  | 63      | 2S   | 315.0-316.5   | 16                     |                             | 5.2+              |
|                   |  | 64      | 2S   | 320.0-321.5   | 12                     | 93                          | 8.6               |
|                   |  | 65      | 2S   | 325.0-326.5   | 18                     | 83                          | 5.2+ 9.6          |

(Continued)

DRILLING RECORD FOR MCH 46N5E-7.5a - Continued

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                |     |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|----------------|-----|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC  |
| 236.0             | (Description on preceding page)  | 66      | 2S   | 330.0-331.5   | 18                     | 202                         | 5.2+           | 9.3 |
|                   |  | 67      | 2S   | 335.0-336.5   | 12                     | 114                         |                |     |
|                   |  | 68      | 2S   | 340.0-341.5   | 3                      | 102                         |                |     |
|                   |  | 69      | 2S   | 345.0-346.5   | 8                      | 191                         |                |     |
| 260.0             | Sand, brown, stratified, becoming coarser with depth   | 70      | 2S   | 350.0-351.5   | 18                     | 132                         | 5.2+           |     |
|                   |  | 71      | 2S   | 355.0-356.5   | 18                     | 120                         |                |     |
|                   |  | 72      | 2S   | 360.0-361.5   | 10                     | 184                         |                |     |
|                   |  | 73      | 2S   | 365.0-366.5   | 6                      |                             |                |     |
|                   |  | 74      | 2S   | 370.0-371.5   | 14                     |                             |                |     |
|                   |  | 75      | 2S   | 375.0-376.5   | 14                     | 173                         |                |     |
|                   |  | 76      | 2S   | 380.0-381.5   | 3                      |                             |                |     |
| 265.0             | Gravel, sandy, coarse; trace clay and silt   | 77      | 2S   | 385.0-386.5   | 14                     | 121                         |                |     |
|                   |  | 78      | 2S   | 390.0-391.5   | 10                     | 88                          |                |     |
| 276.0             | Sand, pink-brown, very fine, round to subrounded, frosted and predominantly quartz; trace of gravel. | 79      | 2S   | 395.0-396.5   | 10                     | 126                         |                |     |
|                   |  | 80      | 2S   | 400.0-401.5   | 16                     | 100                         |                |     |
|                   |  | 81      | 2S   | 405.0-406.5   | 8                      | 142                         |                |     |
|                   |  | 82      | 2S   | 405 -410      | Cuttings               |                             |                |     |
| 290.0             | Till - silt, sandy, pink-brown, hard; trace of clay  | 83      | 2S   | 415.0-416.5   | 8                      | 231                         |                |     |
|                   |  | 84      | 2S   | 415 -420      | Cuttings               |                             |                |     |
|                   |  | 85      | 2S   | 425.0-426.5   | 4                      |                             |                |     |
|                   |  | 86      | 2S   | 425 -430      | Cuttings               |                             |                |     |
|                   |  | 87      | 2S   | 435.0-436.5   | 6                      | 234                         |                |     |
|                   |  | 88      | 2S   | 441.0-442.5   | 8                      | 185                         |                |     |

(Continued)



DRILLING RECORD FOR MCH 46N5E-7.5a - Continued

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                   |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
|                   |  | 89      | 2S   | 441 -447      | Cuttings               |                             |                   |
|                   |  | 90      | 2S   | 447.0-448.5   | 16                     | 238                         |                   |
|                   |  | 91      | 2S   | 452.0-453.5   | 14                     | 237                         |                   |
|                   |  | 92      | 2S   | 453 -455      | Cuttings               |                             |                   |
|                   |  | 93      | 2S   | 460.0-461.5   | 7/3"                   | 284                         |                   |
|                   |  | 94      | 2S   | 460.5-465     | Cuttings               |                             |                   |
|                   |  | 95      | 2S   | 470.0-471.5   | 12                     | 216                         | 7.9               |
|                   | Till - silt, sandy, pink-brown; trace of fine gravel; percent of gravel increasing with depth  | 96      | 2S   | 473.5-475.5   | Cuttings               |                             |                   |
| 350.0             |  |         |      |               |                        |                             |                   |
| 354.0             | *  |         |      |               |                        |                             |                   |
|                   | Gravel, sandy, coarse, very poorly sorted; angular granules underlain by medium sand, well sorted; sandy gravel becoming coarser at 375'; large cobbles of limestone present in lower part |         |      |               |                        |                             |                   |

\* Sand, silty, dark gray, hard; trace of clay and gravel; several wood particles found (buried soil)

(Continued)

DRILLING RECORD FOR MCH 46N5E-7.5a - Continued

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                        |                             |                   |
|-------------------|---|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| 390.0             | (Description on preceding page)   |         |      |               |                        |                             |                   |
| 402.0             | Silt, gray-buff, stratified; small lenses of sand present; highly calcareous; occasional fibers and black organic streaks |         |      |               |                        |                             |                   |
| 406.0             | Gravel, sandy, coarse, gray-brown; interbedded with fine to coarse sand; trace silt                                       |         |      |               |                        |                             |                   |
| 412.0             | Silt, brown; trace of clay  |         |      |               |                        |                             |                   |
| 435.0             | Gravel, coarse; cobbles, gray-brown; some medium sand and trace of silt and clay  |         |      |               |                        |                             |                   |
| 440.0             | Sand, silt, clay, very fine; cobble or gravel beds  |         |      |               |                        |                             |                   |
|                   | Gravel, cobbles, silt, alternating beds; some clay; also beds of fine sand  |         |      |               |                        |                             |                   |

(Continued)

DRILLING RECORD FOR MCH 46N5E-7.5a - Continued

| Depth<br>(1"=10') | Description of material                             | Samples |      |               |                        |  |
|-------------------|---|---------|------|---------------|------------------------|--|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer<br>Q <sub>u</sub> MC |
| 455.0             | (Description on preceding page)                     |         |      |               |                        |  |
| 458.0             | Boulder bed   |         |      |               |                        |  |
| 470.0             | Silt, gray-brown, hard;<br>trace very fine sand     |         |      |               |                        |  |
| 473.5             | Till - clay, silt, sand,<br>medium brown, very hard |         |      |               |                        |  |
| 475.0             | *   |         |      |               |                        |  |
|                   | Bottom of hole @ 475.0'                             |         |      |               |                        |  |

\* Bedrock - dolomite, gray, brown, vugular, some chert

SIZE DISTRIBUTION DATA FOR MCH 46N5E-7.5a

| Cohesive Materials |            |            |                                       |             |             |         |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 1                  | 1.0        | 99.0       | 48                                    | 30          | 22          |         |
| 2                  | 5.0        | 95.0       | 43                                    | 37          | 20          |         |
| 3                  | 6.0        | 94.0       | 40                                    | 39          | 21          |         |
| 4                  | 9.0        | 91.0       | 59                                    | 37          | 4           |         |
| 5                  | 7.0        | 93.0       | 44                                    | 50          | 6           |         |
| 6A                 | 30.0       | 70.0       | 69                                    | 24          | 7           | 2.41    |
| 6B                 | 8.8        | 91.2       | 55                                    | 35          | 10          |         |
| 7                  | 0.1        | 99.9       | 63                                    | 36          | 1           |         |
| 9                  | 12.0       | 88.0       | 47                                    | 36          | 17          |         |
| 11                 | 30.0       | 70.0       | 60                                    | 29          | 11          |         |
| 12                 | 15.0       | 85.0       | 49                                    | 39          | 12          |         |
| 13                 | 9.0        | 91.0       | 46                                    | 29          | 25          |         |
| 15                 | 8.6        | 91.4       | 49                                    | 32          | 19          | 2.45    |
| 16                 | 9.1        | 90.9       | 46                                    | 37          | 17          | 2.44    |
| 17                 | 2.7        | 97.3       | 31                                    | 50          | 19          | 2.49    |
| 18                 | 5.7        | 94.3       | 30                                    | 51          | 19          |         |
| 22                 | 51.0       | 49.0       | 64                                    | 29          | 7           | 2.60    |
| 24                 | 3.2        | 96.8       | 31                                    | 37          | 32          | 2.43    |
| 25                 | 0.1        | 99.9       | 54                                    | 27          | 19          |         |
| 26                 | 0.0        | 100.0      | 1                                     | 66          | 33          | 2.26    |
| 27                 | 0.0        | 100.0      | 0                                     | 64          | 36          | 2.25    |
| 29                 | 0.0        | 100.0      | 0                                     | 61          | 39          | 2.24    |
| 30                 | 0.0        | 100.0      | 0                                     | 49          | 51          | 2.06    |
| 31                 | 0.0        | 100.0      | 1                                     | 38          | 61          | 2.49    |
| 32                 | 0.0        | 100.0      | 0                                     | 44          | 56          | 2.19    |
| 33                 | 0.0        | 100.0      | 0                                     | 53          | 47          | 2.24    |
| 34                 | 0.0        | 100.0      | 1                                     | 81          | 18          | 2.13    |
| 35                 | 2.0        | 98.0       | 15                                    | 60          | 25          | 2.17    |
| 36                 | 3.0        | 97.0       | 14                                    | 73          | 13          | 2.23    |
| 37                 | 8.0        | 92.0       | 41                                    | 47          | 12          | 2.45    |
| 38                 | 7.0        | 93.0       | 43                                    | 45          | 12          |         |
| 39                 | 0.0        | 100.0      | 41                                    | 54          | 5           |         |
| 40                 | 3.0        | 97.0       | 32                                    | 36          | 32          |         |
| 42                 | 4.0        | 96.0       | 33                                    | 33          | 34          | 2.39    |
| 43                 | 5.0        | 95.0       | 30                                    | 40          | 30          |         |
| 44                 | 6.6        | 93.4       | 47                                    | 33          | 20          | 2.42    |
| 45                 | 0.0        | 100.0      | 3                                     | 50          | 47          | 2.31    |
| 46                 | 0.0        | 100.0      | 15                                    | 56          | 29          | 2.15    |
| 47                 | 0.0        | 100.0      | 1                                     | 51          | 48          | 2.14    |
| 48                 | 0.0        | 100.0      | 18                                    | 64          | 18          | 2.22    |

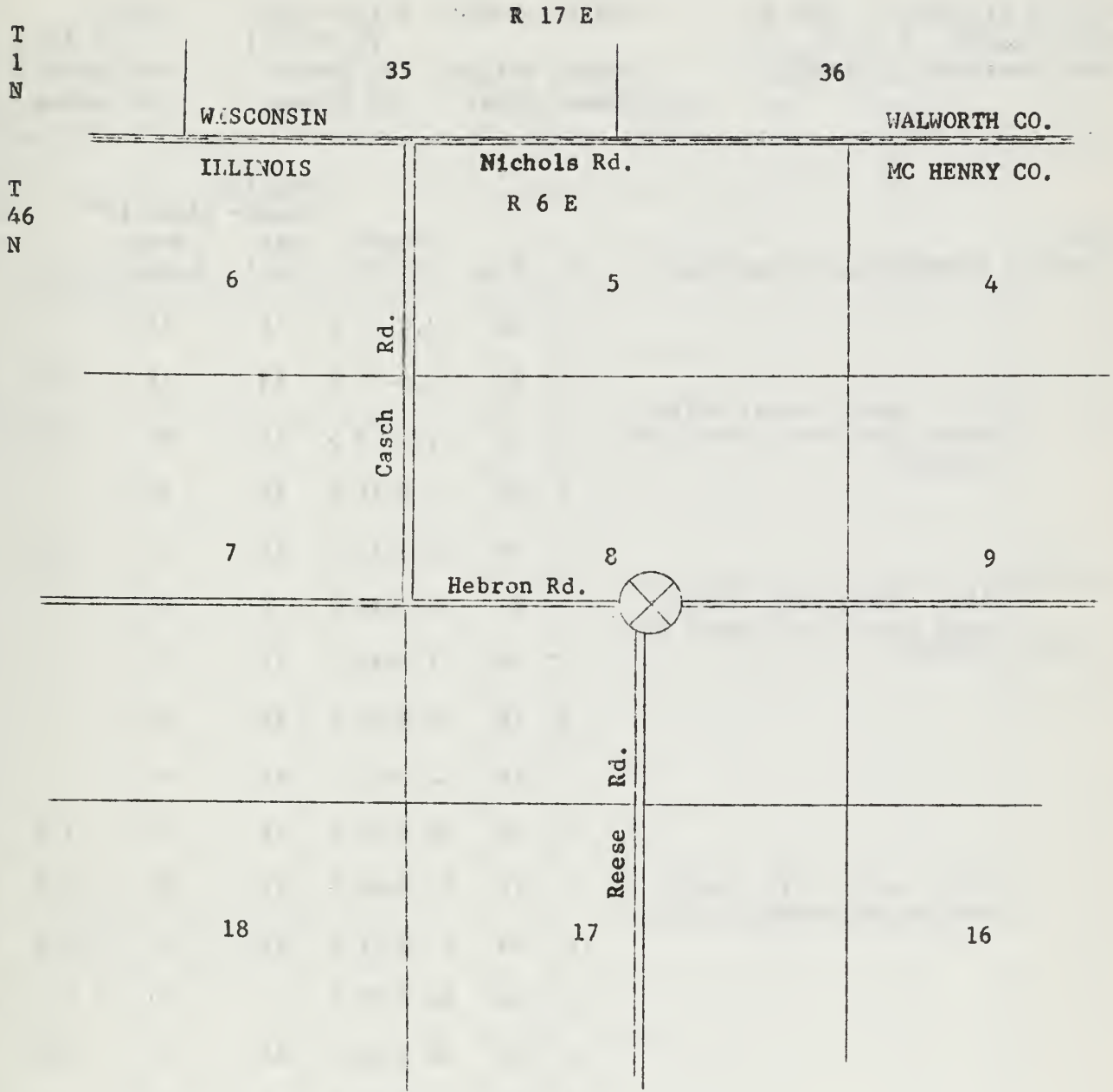
(Continued)

SIZE DISTRIBUTION DATA FOR MCH 46N5E-7.5a - Continued

| Cohesive Materials - Continued |            |            |                                       |             |             |         |
|--------------------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample                         | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                                |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 55A                            | 2.3        | 97.7       | 54                                    | 27          | 19          |         |
| 56                             | 3.0        | 97.0       | 57                                    | 24          | 19          | 2.44    |
| 58                             | 3.0        | 97.0       | 49                                    | 25          | 26          | 2.43    |
| 59                             | 6.0        | 94.0       | 50                                    | 27          | 23          |         |
| 60                             | 2.0        | 98.0       | 48                                    | 27          | 25          | 2.43    |
| 61                             | 8.2        | 91.8       | 44                                    | 30          | 26          |         |
| 62                             | 3.0        | 97.0       | 45                                    | 24          | 31          | 2.40    |
| 63                             | 3.0        | 97.0       | 45                                    | 29          | 26          |         |
| 64                             | 5.6        | 94.4       | 45                                    | 29          | 26          | 2.39    |
| 65                             | 4.0        | 96.0       | 43                                    | 30          | 27          |         |
| 66                             | 2.0        | 98.0       | 44                                    | 29          | 27          | 2.30    |
| 69                             | 3.8        | 96.2       | 56                                    | 35          | 9           |         |
| 70                             | 2.0        | 98.0       | 26                                    | 52          | 22          | 2.31    |
| 73                             | 42.6       | 57.4       | 58                                    | 30          | 12          |         |
| 79                             | 0.0        | 100.0      | 44                                    | 41          | 15          |         |
| 93                             | 0.1        | 99.9       | 5                                     | 83          | 12          |         |
| 95                             | 3.0        | 97.0       | 56                                    | 30          | 14          | 2.41    |

| Noncohesive Materials |                              |      |      |     |      |      |      |      |      |     |      |
|-----------------------|------------------------------|------|------|-----|------|------|------|------|------|-----|------|
| Sample                | Percentage retained on sieve |      |      |     |      |      |      |      |      |     | Pan  |
|                       | 4                            | 9    | 16   | 24  | 32   | 42   | 60   | 80   | 115  | 170 |      |
| 8                     | 9.0                          | 2.0  | 4.0  | 2.5 | 6.0  | 14.0 | 29.5 | 16.0 | 9.0  | 4.0 | 4.0  |
| 20                    | 25.2                         | 12.0 | 8.0  | 3.0 | 6.0  | 8.0  | 11.0 | 7.0  | 5.5  | 3.0 | 11.3 |
| 50                    | 8.5                          | 8.0  | 12.0 | 6.5 | 13.0 | 16.5 | 15.0 | 8.0  | 4.5  | 2.0 | 6.0  |
| 53                    | 34.5                         | 25.5 | 11.0 | 4.0 | 4.0  | 4.0  | 3.5  | 2.0  | 2.0  | 1.0 | 8.5  |
| 73                    | 11.0                         | 6.0  | 2.5  | 2.0 | 10.0 | 24.0 | 24.0 | 8.0  | 3.5  | 2.0 | 7.0  |
| 75                    | 46.0                         | 13.0 | 9.0  | 3.5 | 4.5  | 5.0  | 4.0  | 2.5  | 2.0  | 2.0 | 8.5  |
| 83                    | 41.5                         | 9.0  | 5.5  | 2.0 | 8.0  | 11.0 | 8.5  | 4.5  | 2.5  | 1.5 | 6.0  |
| 85                    | 54.5                         | 14.5 | 9.0  | 2.5 | 2.5  | 2.0  | 2.0  | 1.5  | 2.0  | 1.5 | 8.0  |
| 90                    | 0.3                          | 0.3  | 1.0  | 1.0 | 3.0  | 11.5 | 27.2 | 18.0 | 11.5 | 6.2 | 20.0 |





Location Detail

75' E of cen. line of Reese Road  
 18' S of cen. line of Hebron Road  
 2500' W, 2500' N of SE<sub>c</sub>, sec. 8  
 Harvard Quadrangle

Fig. 11 - Location of boring MCH 46N6E-8.4d

DRILLING RECORD FOR MCH 46N6E-8.4d

Surface elevation: 1160 ft  
Date started: 8-13-62  
Date completed: 9-18-62

Boring method: Hollow auger  
(0-101 ft)  
Hammer weight: 140 pounds  
Hammer drop: 30 inches

Rotary  
(101-332.5 ft)  
475 pounds  
36 inches

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                      |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|----------------------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub><br>MC |
| 17.0              | Till - sand, brown, silty;<br>trace clay; some gravel and<br>cobbles | 1       | 2S   | 2.0- 3.5      | 6                      | 25                          | 13.5                 |
|                   |  | 2       | 2S   | 4.5- 6.0      | 18                     | 16                          | 0.6 12.2             |
|                   |  | 3       | 2S   | 7.0- 8.5      | 18                     | 36                          | 0.5 5.6              |
|                   |  | 4       | 2S   | 9.5-11.0      | 14                     | 36                          | 9.3                  |
|                   |  | 5       | 2S   | 12.0-13.5     | 18                     | 31                          | 0.7 9.3              |
| 22.0              | Till - sand, gray, silty;<br>trace clay; some gravel and<br>cobbles  | 6       | 2S   | 14.5-16.0     | 6                      | 38                          |                      |
|                   |  | 7       | 2S   | 17.0-18.5     | 18                     | 25                          |                      |
| 51.5              | Till - sand, silt, clay,<br>reddish gray-brown, pebbly               | 8       | 2S   | 19.5-21.0     | 18                     | 25                          |                      |
|                   |  | 9       | 2S   | 22.0-23.5     | 18                     | 16                          | 11.7                 |
|                   |  | 10      | 2S   | 24.5-26.0     | 18                     | 20                          | 1.8 11.0             |
|                   |  | 11      | 2S   | 27.0-28.5     | 18                     | 22                          | 1.3 10.4             |
|                   |  | 12      | 2S   | 29.5-31.0     | 18                     | 21                          | 1.3 10.4             |
|                   |  | 13      | 2S   | 32.0-33.5     | 18                     | 20                          | 2.1 11.5             |
|                   |  | 14      | 2S   | 34.5-36.0     | 18                     | 22                          | 2.0                  |
|                   |  | 15      | 2S   | 37.0-38.5     | 6                      | 37                          |                      |
| 59.0              | Sand, gray, fine to medium,<br>clean, well graded; silt<br>lenses    | 16      | 2S   | 39.5-41.0     | 18                     | 19                          | 2.3 11.0             |
|                   |  | 17      | 2S   | 42.0-43.5     | 18                     | 25                          | 2.5                  |
|                   |  | 18      | 2S   | 44.5-46.0     | 18                     | 23                          | 2.3 10.2             |
|                   | Till - sand, silty, pinkish<br>gray-brown; pebbles; a little<br>clay | 19      | 2S   | 47.0-48.5     | 18                     | 24                          | 2.5                  |
|                   |  | 20      | 2S   | 49.5-51.0     | 18                     | 21                          | 3.6 10.3             |

(Continued)

DRILLING RECORD FOR MCH 46N6E-8.4d - Continued

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                        |                             |                |      |  |
|-------------------|---|---------|------|---------------|------------------------|-----------------------------|----------------|------|--|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |  |
| 81.5              | (Description on preceding<br>page)  | 21      | 2S   | 52.0- 53.5    | 18                     | 25                          |                |      |  |
|                   |   | 22      | 2S   | 54.5- 56.0    | 12                     | 19                          |                |      |  |
|                   |   | 23      | SS   | 59.5- 61.0    | 13                     | 25                          | 1.5            | 10.9 |  |
|                   |   | 24      | SS   | 62.0- 63.5    | 15                     | 21                          | 1.1            | 11.4 |  |
|                   |   | 25      | SS   | 64.5- 66.0    | 17                     | 26                          | 1.6            | 10.4 |  |
|                   | Till - sand, silt, clay,<br>pinkish gray-brown; a few<br>pebbles; a few silt lenses | 26      | SS   | 67.0- 68.5    | 2                      | 24                          |                |      |  |
|                   |   | 27      | SS   | 69.5- 71.0    | 2                      | 55                          |                |      |  |
|                   |   | 28      | SS   | 72.0- 73.5    | 14                     | 27                          | 1.1            | 10.2 |  |
|                   |   | 29      | SS   | 74.5- 76.0    | 8                      | 17                          |                |      |  |
|                   |   | 30      | SS   | 77.0- 78.5    | 11                     | 15                          | 1.3            | 10.2 |  |
|                   |   | 31      | SS   | 79.5- 81.0    |                        | 24                          |                |      |  |
|                   |   | 32      | SS   | 82.0- 83.5    | 13                     | 16                          | 1.7            | 8.3  |  |
|                   |   | 33      | SS   | 84.5- 86.0    | 14                     | 17                          | 1.3            | 11.7 |  |
|                   |   | 34      | SS   | 87.0- 88.5    | 18                     | 18                          | 1.3            | 10.8 |  |
|                   |   | 35      | SS   | 89.5- 91.0    | 18                     | 19                          | 1.3            | 10.4 |  |
|                   |   | 36      | SS   | 92.0- 93.5    | 6                      | 17                          | 0.8            | 11.2 |  |
|                   |   | 37      | SS   | 94.5- 96.0    | 18                     | 18                          | 1.1            | 10.9 |  |
|                   |   | 38      | SS   | 97.0- 98.5    | 1                      | 22                          |                |      |  |
|                   |   | 39      | SS   | 99.5-101.0    |                        | 15                          |                |      |  |
|                   |   | 40      | 2S   | 105.0-106.5   | 14                     | 32                          | 4.0            | 10.3 |  |
|                   |   | 41      |      | 110.0-112.5   | Cuttings               |                             |                |      |  |
|                   |   | 42      | 2S   | 115.0-116.5   | 18                     | 29                          | 3.3            |      |  |

145.0

(Continued)

DRILLING RECORD FOR MCH 46N6E-8.4d - Continued

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                        |                             |                   |
|-------------------|---|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| 152.0             | Till - silt, clayey, brown;<br>some sand and cobbles  | 43      |      | 115 -120      | Cuttings               |                             |                   |
|                   |   | 44      | 2S   | 125.0-126.5   | 2                      | 5                           |                   |
| 159.0             | Silt, gray, very hard   | 45      |      | 126.0-130     | Cuttings               |                             |                   |
|                   |   | 46      | 2S   | 135.0-136.5   | 18                     | 23                          | 3.1 9.4           |
|                   | Till - sand, silt, clay,<br>red-brown, soft; few cobbles,<br>gravel size, and quantity<br>increasing with depth | 47      |      | 140.0-142.5   | Cuttings               |                             |                   |
|                   |   | 48      | 2S   | 145.0-146.5   | 16                     | 32                          | 2.3 11.0          |
|                   |   | 49      |      | 150.0-152.5   | Cuttings               |                             |                   |
|                   |   | 50      | 2S   | 155.0-156.5   | 17                     | 178                         |                   |
|                   |   | 51      |      | 160.0-162.5   | Cuttings               |                             |                   |
|                   |   | 52      | 2S   | 165.0-166.5   | 15                     | 36                          | 2.5 10.7          |
|                   |   | 53      |      | 170.0-172.5   | Cuttings               |                             |                   |
|                   |   | 54      | 2S   | 175.0-176.5   | 9                      | 19                          | 2.3 11.0          |
|                   |   | 55      |      | 180.0-182.5   | Cuttings               |                             |                   |
|                   |   | 56      | 2S   | 185.0-186.5   | 16                     | 25                          | 2.9 10.7          |
|                   |   | 57      |      | 190.0-192.5   | Cuttings               |                             |                   |
|                   |   | 58      | 2S   | 195.0-196.5   | 13                     | 28                          |                   |
|                   |   | 59      |      | 200.0-202.5   | Cuttings               |                             |                   |
|                   |   | 60      | 2S   | 205.0-206.5   | 17                     | 34                          | 3.2 12.4          |
|                   |   | 61      |      | 210.0-212.5   | Cuttings               |                             |                   |
|                   |   | 62      | 2S   | 215.0-216.5   | 16                     | 45                          | 5.2+ 10.1         |
|                   |   | 63      |      | 220.0-222.5   | Cuttings               |                             |                   |
|                   |   | 64      | 2S   | 225.0-226.5   | 18                     | 39                          | 4.7 10.2          |
|                   |   | 65      |      | 230.0-232.5   | Cuttings               |                             |                   |

(Continued)

DRILLING RECORD FOR MCH 46N6E-8.4d - Continued

| Depth<br>(1"=10') | Description of material            | Samples |      |               |                        |                             |                   |
|-------------------|------------------------------------|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |                                    | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
|                   |                                    | 66      | 2S   | 235.0-236.5   | 18                     | 32/12"                      | 3.1               |
|                   |                                    | 67      | 2S   | 240.0-241.5   | 19                     | 62                          | 4.0 10.4          |
|                   |                                    | 68      |      | 245.0-247.5   | Cuttings               |                             |                   |
|                   |                                    | 69      | 2S   | 250.0-251.5   | 17                     | 58                          | 5.1 10.9          |
|                   |                                    | 70      |      | 255.0-257.5   | Cuttings               |                             |                   |
|                   |                                    | 71      | 2S   | 260.0-261.5   | 6                      | 35                          |                   |
|                   |                                    | 72      |      | 265.0-267.5   | Cuttings               |                             |                   |
|                   | (Description on preceding<br>page) | 73      | 2S   | 270.0-271.5   | 14                     | 65                          | 5.2+ 10.0         |
|                   |                                    | 74      | 2S   | 275.0-276.5   | 19                     | 65                          | 5.2+ 9.2          |
|                   |                                    | 75      |      | 280.0-282.5   | Cuttings               |                             |                   |
|                   |                                    | 76      | 2S   | 285.0-286.5   | 18                     | 56                          | 5.2+ 10.0         |
|                   |                                    | 77      |      | 290.0-292.5   | Cuttings               |                             |                   |
|                   |                                    | 78      | 2S   | 295.0-296.5   | 20                     | 69                          | 4.4 9.1           |
|                   |                                    | 79      | 2S   | 300.0-301.5   | 17                     |                             | 4.4 9.8           |
|                   |                                    | 80      | 2S   | 305.0-306.5   | 17                     | 69                          | 4.0               |
|                   |                                    | 81      |      | 310.0-312.5   | Cuttings               |                             |                   |
|                   |                                    | 82      | 2S   | 313.0-314.5   | 13                     | 105                         |                   |
|                   |                                    | 83      | 2S   | 318.0-319.5   | 16                     | 59                          |                   |
|                   |                                    | 84      | 2S   | 323.0-324.5   | 6                      | 201                         |                   |
|                   |                                    | 85      | 2S   | 329.0-329.5   | 6                      | 159                         |                   |
|                   |                                    | 86      |      | 329 -331      | Cuttings               |                             |                   |

(Continued)



DRILLING RECORD FOR MCH 46N6E-8.4d - Continued

| Depth<br>(1"=10') | Description of material   | Samples |      |               |                        |   |
|-------------------|---|---------|------|---------------|------------------------|---|
|                   |   | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer<br>Q <sub>u</sub><br>MC |
| 313.0             | (Description on page 56)  |         |      |               |                        |   |
| 318.0             | Sand and silty clay beds,<br>alternating; silty clay bed<br>2" thick; 4" sand beds  |         |      |               |                        |   |
| 322.0             | Silt and clay beds, strati-<br>fied, gray to dark gray; thin<br>very fine sand beds |         |      |               |                        |   |
| 325.0             | *   |         |      |               |                        |   |
| 329.5             | Till - clay, silt, sand,<br>buff brown; gravel                                      |         |      |               |                        |   |
| 332.5             | Bedrock - limestone, dolomi-<br>tic, gray-white, fossiliferous                      |         |      |               |                        |   |
|                   | Bottom of hole @ 332.5'   |         |      |               |                        |   |

\* Sand, gray-brown, fine to coarse; contains gravel and cobbles, fragmental

SIZE DISTRIBUTION DATA FOR MCH 46N6E-8.4d

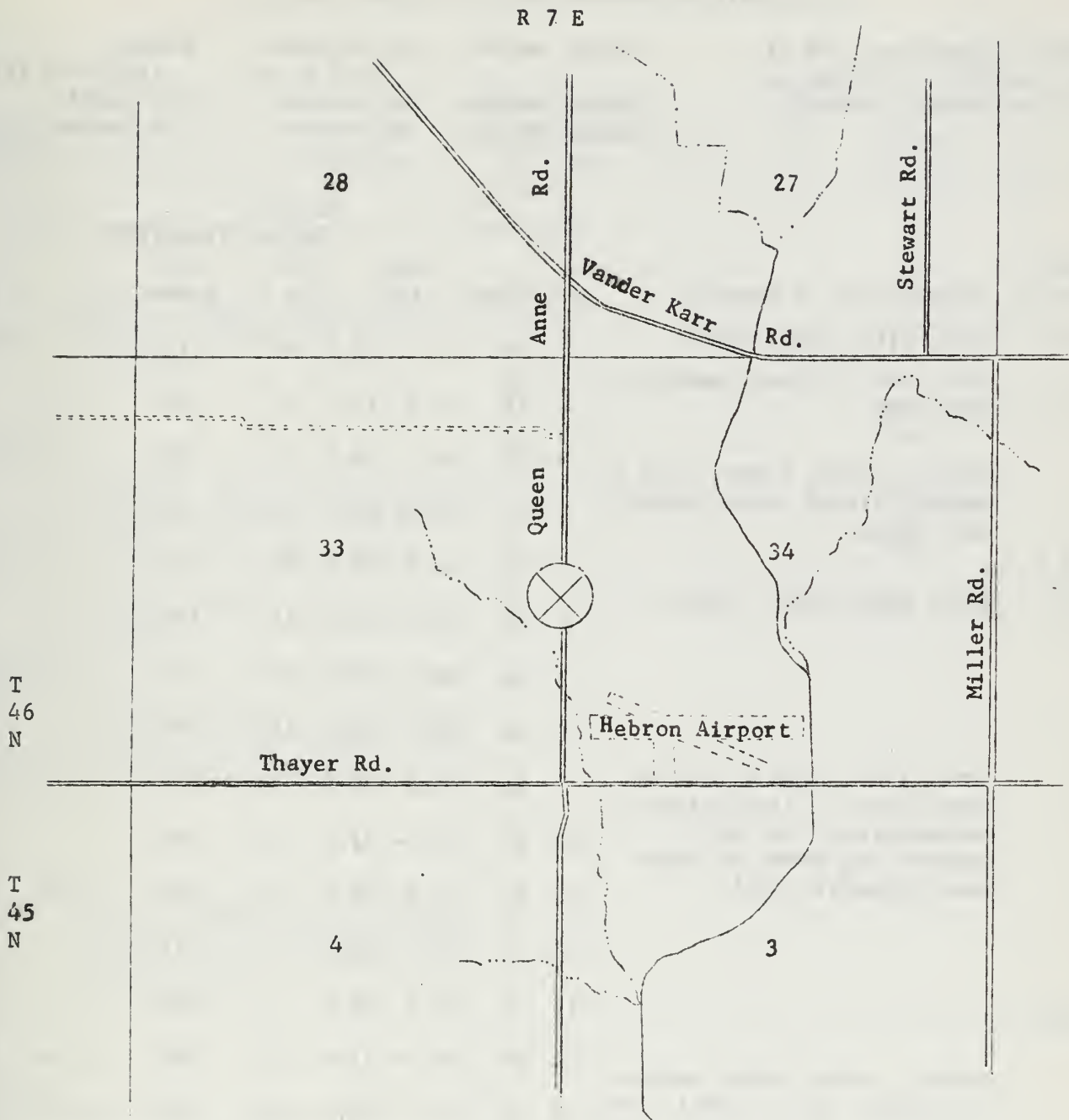
| Cohesive Materials |            |            |                                       |             |             |         |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 1                  | 11.0       | 89.0       | 53                                    | 41          | 6           |         |
| 2                  | 11.0       | 89.0       | 55                                    | 37          | 8           |         |
| 3                  | 10.0       | 90.0       | 58                                    | 35          | 7           |         |
| 4                  | 16.0       | 84.0       | 54                                    | 35          | 11          |         |
| 5                  | 7.0        | 93.0       | 57                                    | 35          | 8           |         |
| 6                  | 8.0        | 92.0       | 52                                    | 38          | 10          |         |
| 7                  | 21.0       | 79.0       | 69                                    | 25          | 6           | 2.48    |
| 8                  | 13.0       | 87.0       | 57                                    | 31          | 12          |         |
| 9                  | 5.0        | 95.0       | 36                                    | 38          | 26          | 2.38    |
| 10                 | 5.0        | 95.0       | 40                                    | 35          | 25          |         |
| 11                 | 6.0        | 94.0       | 45                                    | 36          | 19          |         |
| 12                 | 8.0        | 92.0       | 42                                    | 35          | 23          |         |
| 13                 | 6.0        | 94.0       | 39                                    | 39          | 22          | 2.40    |
| 14                 | 5.0        | 95.0       | 40                                    | 36          | 24          |         |
| 15                 | 4.0        | 96.0       | 38                                    | 37          | 25          |         |
| 16                 | 6.0        | 94.0       | 38                                    | 38          | 24          |         |
| 17                 | 7.0        | 93.0       | 36                                    | 39          | 25          | 2.34    |
| 18                 | 7.0        | 93.0       | 39                                    | 40          | 21          |         |
| 19                 | 3.0        | 97.0       | 37                                    | 36          | 27          |         |
| 20                 | 11.0       | 89.0       | 37                                    | 39          | 24          | 2.36    |
| 23                 | 7.0        | 93.0       | 36                                    | 40          | 24          | 2.44    |
| 24                 | 4.0        | 96.0       | 37                                    | 36          | 27          |         |
| 25                 | 4.0        | 96.0       | 37                                    | 36          | 27          | 2.21    |
| 28                 | 8.0        | 92.0       | 42                                    | 36          | 22          |         |
| 29                 | 20.0       | 80.0       | 48                                    | 38          | 14          |         |
| 30                 | 2.0        | 98.0       | 37                                    | 39          | 24          | 2.37    |
| 32                 | 4.0        | 96.0       | 34                                    | 41          | 25          |         |
| 33                 | 6.0        | 94.0       | 38                                    | 40          | 22          | 2.39    |
| 34                 | 5.0        | 95.0       | 37                                    | 37          | 26          |         |
| 35                 | 5.0        | 95.0       | 36                                    | 41          | 23          |         |
| 37                 | 8.0        | 92.0       | 37                                    | 36          | 27          | 2.38    |
| 40                 | 7.0        | 93.0       | 37                                    | 36          | 27          | 2.41    |
| 42                 | 4.0        | 96.0       | 21.5                                  | 59.5        | 19          | 2.34    |
| 46                 | 11.0       | 89.0       | 37                                    | 36          | 27          |         |
| 48                 | 8.0        | 92.0       | 34                                    | 41          | 25          | 2.36    |
| 50                 | 4.0        | 96.0       | 37                                    | 40          | 23          |         |
| 52                 | 7.0        | 93.0       | 34                                    | 40          | 26          | 2.42    |
| 54                 | 5.0        | 95.0       | 36                                    | 36          | 28          | 2.42    |
| 56                 | 3.0        | 97.0       | 34                                    | 38          | 28          | 2.40    |
| 58                 | 3.0        | 97.0       | 36                                    | 39          | 25          |         |

(Continued)

SIZE DISTRIBUTION DATA FOR MCH 46N6E-8.4d - Continued

| Cohesive Materials - Continued |            |            |                                       |             |             |         |
|--------------------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample                         | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                                |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 60                             | 5.0        | 95.0       | 34                                    | 41          | 25          | 2.38    |
| 62                             | 3.0        | 97.0       | 36                                    | 38          | 26          | 2.38    |
| 64                             | 4.0        | 96.0       | 36                                    | 34          | 30          | 2.38    |
| 66                             | 4.0        | 96.0       | 35                                    | 42          | 23          | 2.39    |
| 67                             | 3.0        | 97.0       | 36                                    | 38          | 26          | 2.44    |
| 69                             | 3.0        | 97.0       | 36                                    | 34          | 30          | 2.45    |
| 71                             | 5.0        | 95.0       | 36                                    | 35          | 29          | 2.54    |
| 73                             | 5.0        | 95.0       | 35                                    | 42          | 23          | 2.49    |
| 74                             | 3.0        | 97.0       | 35                                    | 42          | 23          | 2.45    |
| 76                             | 3.0        | 97.0       | 35                                    | 39          | 26          | 2.40    |
| 78                             | 2.0        | 98.0       | 34                                    | 42          | 24          |         |
| 79                             | 3.0        | 97.0       | 33                                    | 44          | 23          |         |
| 80                             | 4.0        | 96.0       | 32                                    | 38          | 30          | 2.41    |

| Noncohesive Materials |                              |     |     |     |     |     |      |      |      |      |      |
|-----------------------|------------------------------|-----|-----|-----|-----|-----|------|------|------|------|------|
| Sample                | Percentage retained on sieve |     |     |     |     |     |      |      |      |      |      |
|                       | 4                            | 9   | 16  | 24  | 32  | 42  | 60   | 80   | 115  | 170  | Pan  |
| 82                    | 0.0                          | 0.0 | 0.1 | 0.1 | 1.3 | 9.0 | 17.0 | 29.5 | 16.0 | 11.5 | 15.5 |
| 84                    | 12.0                         | 5.0 | 6.5 | 3.0 | 5.0 | 7.0 | 13.0 | 12.5 | 12.5 | 8.0  | 15.5 |
| 85                    | 4.5                          | 6.0 | 7.0 | 3.5 | 5.0 | 6.0 | 9.5  | 10.5 | 9.5  | 8.5  | 30.0 |



Location Detail

300' S of mid-sec. line  
18' W of cen. line of Queen Anne Road  
18' W, 2340' N of SE<sub>c</sub>, sec. 33  
Hebron Quadrangle



Fig. 12 - Location of boring MCH 46N7E-33.1d

DRILLING RECORD FOR MCH 46N7E-33.1d

Surface elevation: 895 ft

Date started: 8-31-62

Date completed: 9-24-62

Boring method: Hollow auger  
(0-99.5 ft)

Hammer weight: 140 pounds

Hammer drop: 30 inches

Rotary  
(99.5-144 ft)

475 pounds

36 inches

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                |      |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|----------------|------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> | MC   |
| 3.0               | Clay, silty, dark brown  | 1       | 2S   | 4.5- 6.0      | 18                     | 17                          |                | 17.1 |
| 5.5               | Silt, tan to brown, mottled with gray  | 2       | 2S   | 9.5- 11.0     | 18                     | 38                          |                |      |
|                   | Gravel, sandy, brown, fine to medium; little coarse gravel and cobbles   | 3       | 2S   | 14.5- 16.0    | 18                     | 50                          |                |      |
|                   |  | 4       | 2S   | 19.5- 21.0    | 18                     | 18                          |                |      |
| 15.5              |  | 5       | 2S   | 24.5- 26.0    | 18                     | 47                          |                |      |
| 18.0              | Sand, gray, fine, clean  | 6       | 2S   | 29.5- 31.0    | 12                     | 170                         |                |      |
|                   |  | 7       | 2S   | 34.5- 36.0    | 12                     | 100                         |                |      |
|                   |  | 8       | 2S   | 39.5- 41.0    | 12                     | 165                         |                |      |
|                   | Sand, gray, fine to medium; trace clay; a little fine to medium gravel and silt; pockets and seams of clean sand (possibly till) | 9       | 2S   | 44.5- 46.0    | 9                      | 55                          |                |      |
|                   |  | 10      | 2S   | 49.5- 51.0    | 6                      | 80                          |                |      |
|                   |  | 11      | 2S   | 54.5- 56.0    | 18                     | 100                         | 5.2+           | 7.8  |
|                   |  | 12      | 2S   | 59.5- 61.0    | 12                     | 119                         |                |      |
| 43.0              |  | 13      | 2S   | 64.5- 66.0    | 4                      | 104                         |                |      |
|                   | Gravel, sandy, gray, medium to coarse; top 4' mostly sand  | 14      | 2S   | 69.5- 71.0    | 18                     | 200                         | 5.2+           | 9.1  |
|                   |  | 15      | 2S   | 74.5- 76.0    | 18                     | 130                         | 5.2+           | 8.8  |
| 53.5              |  | 16      | 2S   | 79.5- 81.0    | 18                     | 138                         | 5.2+           | 7.9  |
| 58.0              | Till - sand, silt, clay, red-brown, very pebbly  | 17      | 2S   | 84.5- 86.0    | 18                     | 170                         | 2.5+           | 8.1  |
|                   |  | 18      | 2S   | 89.5- 91.0    | 12                     | 130                         |                |      |
|                   | Gravel, sandy, reddish brown, fine to coarse   | 19      | 2S   | 94.5- 96.0    | 0                      | 150                         |                |      |
|                   |  | 21      | W    | 96.0- 99.5    |                        |                             |                |      |
| 68.0              |  | 20      | 2S   | 99.5-101.0    | 14                     | 200                         | 5.2+           | 8.9  |

(Continued)



DRILLING RECORD FOR MCH 46N7E-33.1d - Continued

| Depth<br>(1"=10') | Description of material  | Samples |      |               |                        |                             |                   |
|-------------------|--|---------|------|---------------|------------------------|-----------------------------|-------------------|
|                   |  | No.     | Type | Depth<br>(ft) | Recov-<br>ery<br>(in.) | Blows/18"<br>drop<br>hammer | Q <sub>u</sub> MC |
| 87.5              | Till - sand, silt, clay, red-brown, pebbly; few sand pockets   | 22      | 2S   | 105.0-106.5   | 87                     | 90                          |                   |
|                   |  | 23      | 2S   | 110.0-111.5   | 4                      | 68                          |                   |
|                   |  | 24      | 2S   | 115.0-116.5   | 11                     |                             |                   |
|                   |  | 25      | 2S   | 120.0-121.5   | 10                     |                             |                   |
|                   |  | 26      | 2S   | 125.0-126.5   | 9                      | 148                         |                   |
| 93.5              | Gravel, sandy, brownish gray, fine to coarse; silty and clayey seams and pockets                     | 27      | 2S   | 130.0-131.5   | 6                      | 103                         |                   |
|                   |  | 28      | 2S   | 135.0-136.5   | 16                     | 179                         |                   |
| 99.5              | Sand, brownish gray, fine to coarse  | 29      |      | 137.0-143     | Cuttings               |                             |                   |
| 102.0             | *  |         |      |               |                        |                             |                   |
| 106.0             | Sand and gravel, gray-brown, stratified, well sorted from very fine to coarse                        |         |      |               |                        |                             |                   |
| 127.0             | Till - sand, silt, clay, fine gravel, dark red-brown; some sand lenses and cobbles; clay content low |         |      |               |                        |                             |                   |
| 137.0             | Sand and silt beds, gray; interbedded red-brown clays; also bed of gravel and cobbles                |         |      |               |                        |                             |                   |
| 139.0             | **   |         |      |               |                        |                             |                   |
| 144.0             | Dolomite, dark gray-buff   |         |      |               |                        |                             |                   |
|                   | Bottom of hole @ 144.0'  |         |      |               |                        |                             |                   |

\* Till - sand, silty, red-brown, mottled with gray; pebbles

\*\* Bedrock - limestone, dolomitic, white, vugular

SIZE DISTRIBUTION DATA FOR MCH 46N7E-33.1d

| Cohesive Materials |            |            |                                       |             |             |         |
|--------------------|------------|------------|---------------------------------------|-------------|-------------|---------|
| Sample             | % > 2.0 mm | % < 2.0 mm | Size distribution of portion < 2.0 mm |             |             | Density |
|                    |            |            | % > .062 mm                           | % > .004 mm | % < .004 mm |         |
| 1                  | 0.0        | 100.0      | 8                                     | 77          | 15          |         |
| 4                  | 17.0       | 83.0       | 64                                    | 29          | 7           | 2.57    |
| 7                  | 12.0       | 88.0       | 57                                    | 39          | 4           |         |
| 8                  | 7.0        | 93.0       | 59                                    | 37          | 4           |         |
| 11                 | 3.0        | 97.0       | 39                                    | 38          | 23          | 2.45    |
| 12                 | 3.0        | 97.0       | 80                                    | 17          | 3           |         |
| 14                 | 3.0        | 97.0       | 35                                    | 39          | 26          | 2.43    |
| 15                 | 6.0        | 94.0       | 37                                    | 37          | 26          |         |
| 16                 | 5.0        | 95.0       | 37                                    | 39          | 24          | 2.46    |
| 17                 | 12.0       | 88.0       | 39                                    | 38          | 23          |         |
| 18                 | 28.0       | 72.0       | 42                                    | 35          | 23          |         |
| 20                 | 4.0        | 96.0       | 51                                    | 33          | 16          | 2.43    |
| 22                 | 15.0       | 85.0       | 45                                    | 45          | 10          |         |
| 23                 | 19.0       | 81.0       | 54                                    | 30          | 16          |         |
| 24                 | 4.0        | 96.0       | 37                                    | 39          | 24          | 2.48    |
| 25                 | 3.0        | 97.0       | 36                                    | 34          | 30          |         |

#### ENVIRONMENTAL GEOLOGY NOTES SERIES

1. Controlled Drilling Program in Northeastern Illinois: J. E. Hackett and G. M. Hughes. April 1965.
2. Data from Controlled Drilling Program in DuPage County, Illinois: Jean I. Larsen and C. R. Lund. May 1965.
3. Activities in Environmental Geology in Northeastern Illinois: Jean I. Larsen and J. E. Hackett. June 1965.
4. Geological and Geophysical Investigations for a Ground-Water Supply at Macomb, Illinois: Keros Cartwright and D. A. Stephenson. July 1965.
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6. Data from Controlled Drilling Program in Kane, Kendall, and DeKalb Counties, Illinois: C. R. Lund. October 1965.







